SOIL SURVEY OF

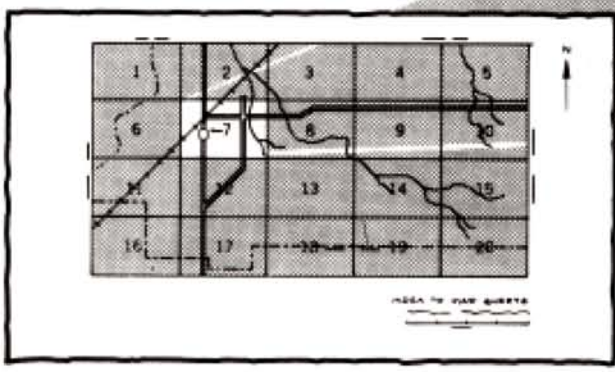
Leslie and Perry Counties, Kentucky

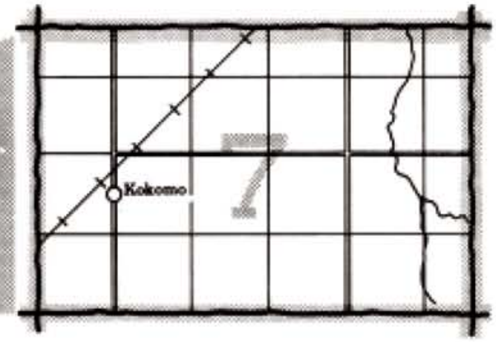
United States Department of Agriculture
Soil Conservation Service and Forest Service

in cooperation with
Kentucky Department for Natural Resources and Environmental Protection
and
Kentucky Agricultural Experiment Station

HOW TO USE

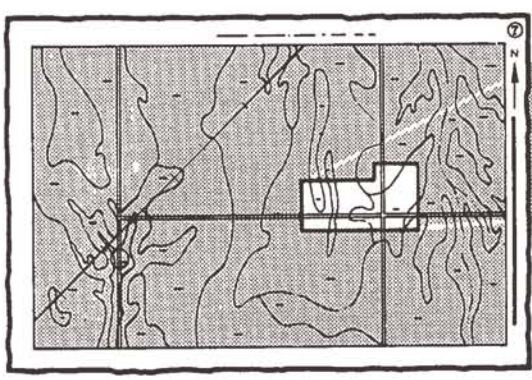
1. Locate your area of interest on the "Index to Map Sheets"

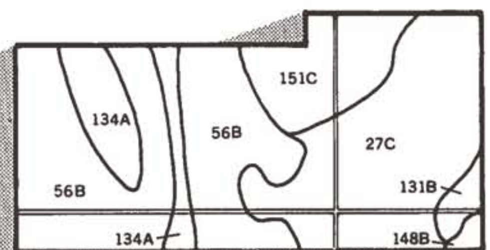




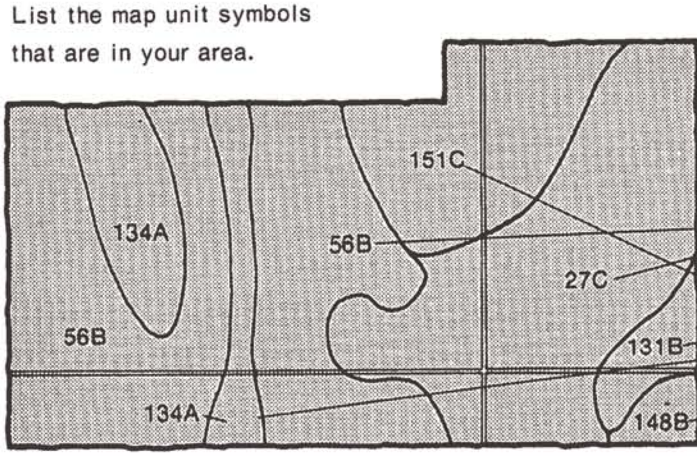
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

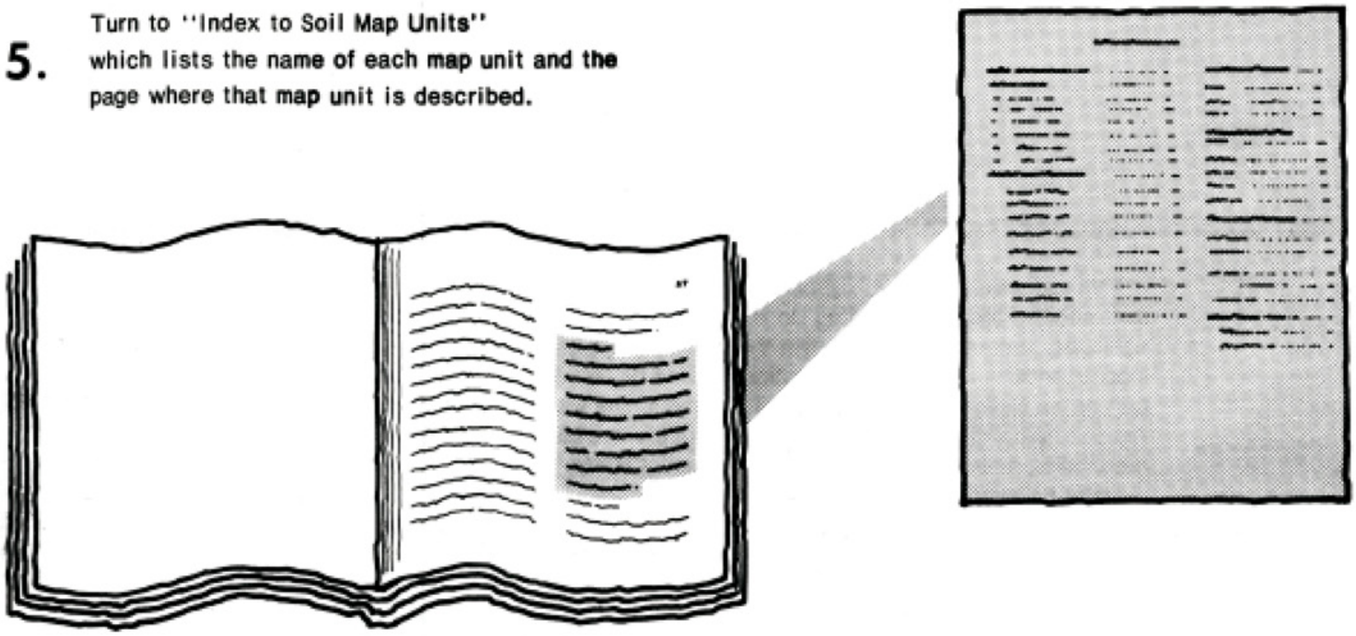


Symbols

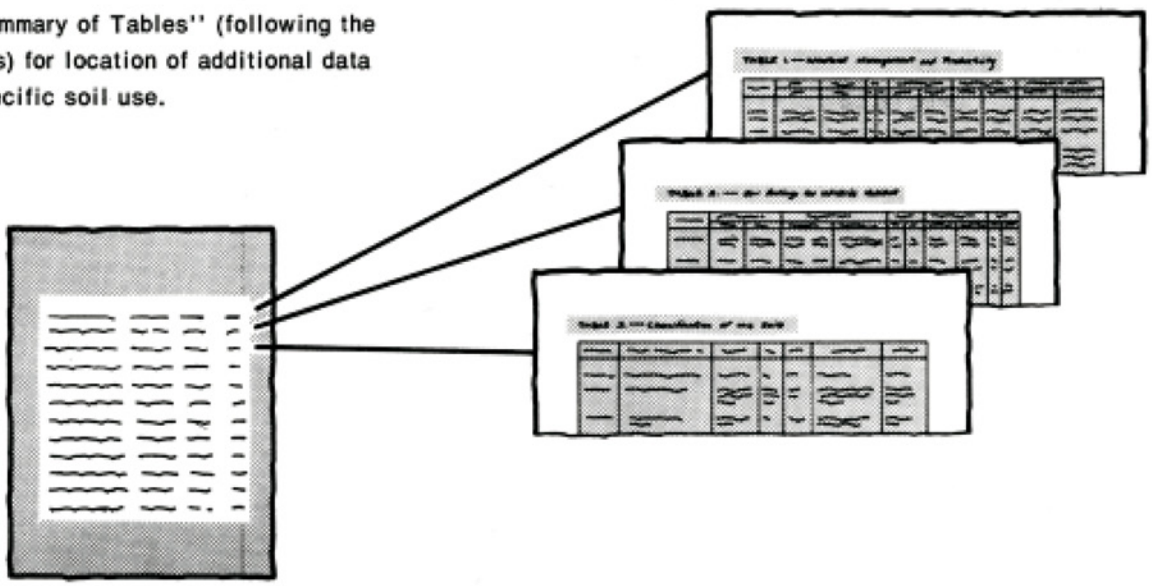
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1975-78. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, the Kentucky Department for Natural Resources and Environmental Protection, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Leslie County Soil Conservation District and the Perry County Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Mixed hardwood trees growing on typical ridge and valley topography.

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Issued May 1982

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foreword

This soil survey contains information that can be used in land-planning programs in Leslie and Perry Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

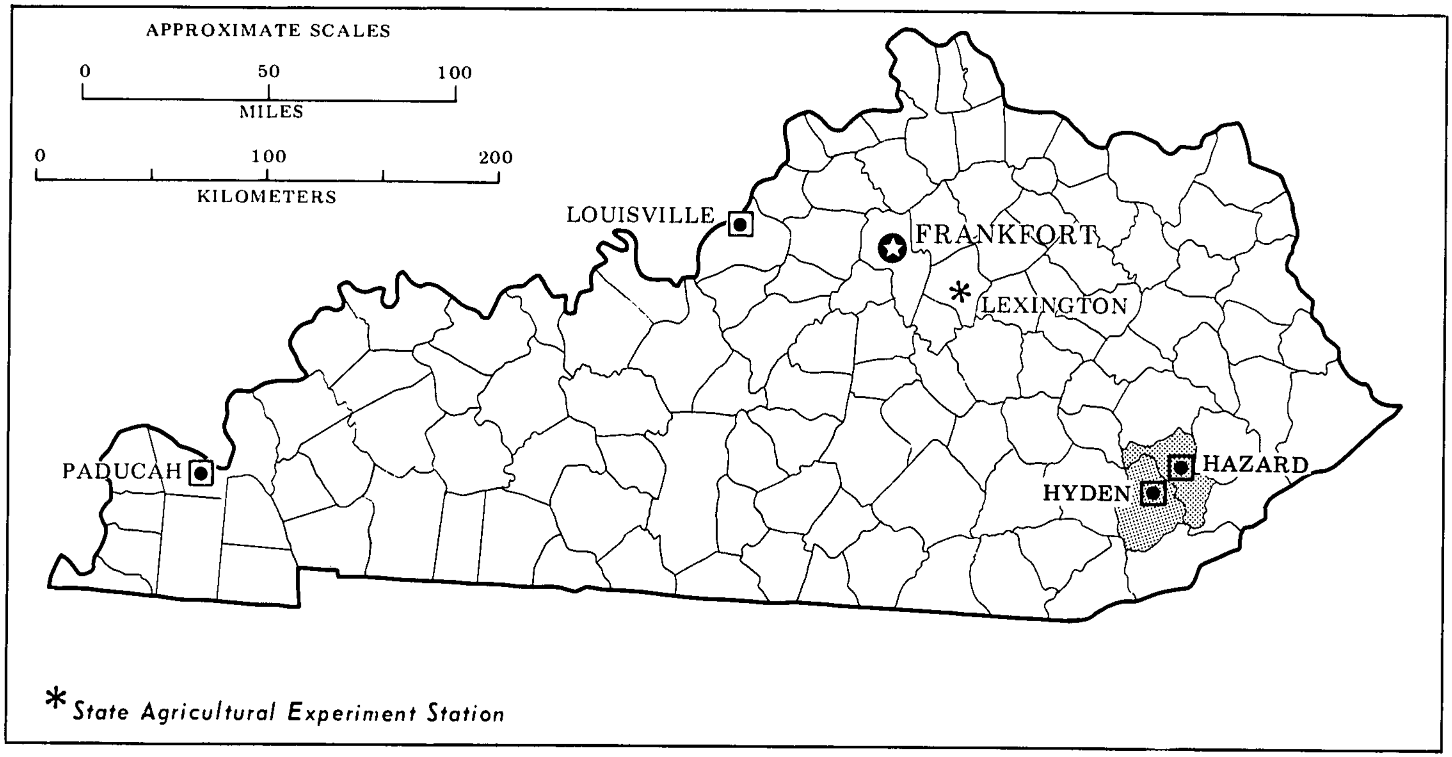
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Eddie L. Wood

Eddie L. Wood
State Conservationist
Soil Conservation Service



Location of Leslie and Perry Counties in Kentucky.

soil survey of
Leslie and Perry Counties, Kentucky

By Raymond A. Hayes

Soils surveyed by Roy V. Rice and Raymond A. Hayes,
Soil Conservation Service and
Steve E. Jacobs
Kentucky Department for Natural Resources and Environmental Protection

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
Kentucky Department for Natural Resources and Environmental Protection
and Kentucky Agricultural Experiment Station

LESLIE and PERRY COUNTIES are in the southeastern part of Kentucky. The counties occupy 750 square miles, or about 480,000 acres, in the Appalachian Mountains. These two counties are bounded on the north by Breathitt County, on the south by Harlan and Bell Counties, on the east by Letcher and Knott Counties, and on the west by Clay and Owsley Counties. Hazard, a city of 8,000, is the county seat of Perry County. Hyden, population of 500, is the county seat of Leslie County. About 25,000 people live in Perry County and about 13,000 in Leslie County. Most of the rural population live along tributary streams of the Kentucky River.

general nature of the survey area

history

Perry County was created from parts of Clay and Floyd Counties. The county was named for Oliver Hazard Perry, a hero of a naval battle on Lake Erie during the War of 1812. Many Kentucky volunteers helped win this famous battle.

Leslie County was created from parts of Clay, Harlan, and Perry Counties. The county was named in honor of Preston E. Leslie, Governor of Kentucky from 1871 to 1875.

transportation

Major highways of the survey area are Kentucky Highway 15, Kentucky Highway 80, U.S. Highway 421, and the Daniel Boone Parkway. A major railroad serves Perry County. An airport at Hazard can accommodate light aircraft. Nearby commercial airports are the London-Corbin War Memorial Airport and the Blue Grass Field in Lexington.

water supply

Water is supplied to the survey area from two major sources—rivers, mainly the Kentucky River and also some of its small tributary streams, and the available ground water. The Kentucky River is the largest source of water for both public and commercial use.

The ground water is supplied from wells drilled into rocks geologically of the Pennsylvanian System. Most wells yield enough water for domestic use. Springs are common, but they are often unreliable as a continuous source of water.

native vegetation

The dominant native vegetation of the survey area is a mixed mesophytic forest interspersed with canebrakes along streams (*20*). On ridgetops, common trees include chestnut oak, scarlet oak, pitch pine, and Virginia pine. On the south- to west-facing slopes, the overstory is mainly a mixed oak-hickory forest that has scattered stands of yellow-poplar and pine. On the north- to east-facing slopes and in the well drained bottom lands, common trees include yellow-poplar, black walnut, northern red oak, red maple, sugar maple, yellow buckeye, American sycamore, sweet birch, and river birch.

The understory of the forest in the survey area consists of flowering dogwood, serviceberry, ironwood, American holly, mountain-laurel, great rhododendron, magnolia, pawpaw, blueberries, and hazelnuts. Many plants once used for food, spices, and medicinal herbs still grow in the understory.

Less than 6,000 acres in the survey area was used for crops, according to the 1974 Census of Agriculture. Of the total, about 528 acres was used to produce 21,845 bushels of corn and about 57 acres was used to produce 108,464 pounds of tobacco. About 160 tons of hay were produced on 200 acres. A few cattle and hogs are raised in the survey area.

The uplands are too steep for farming. The narrow, fertile bottom lands have good potential for increased crop production; however, acreage used for cultivated crops and pasture has gradually been decreasing as the coal mining industry expands. An expanding population, roads, and industry are competing for the rest of the acreage that is suitable for crops.

economic geology

Beecher J. Hines, geologist, Soil Conservation Service, helped prepare this section.

Leslie and Perry Counties are underlain by sedimentary rocks of the Pennsylvanian Period (*10*). These counties are in the heart of the East Kentucky Coal Field. Coal has an important role in the local economy and is the most important mineral resource within these counties.

The coal members range from 12,000 to 14,000 BTU in heating value, from 48 to 56 percent in fixed carbon, and from 3.2 to 12.7 percent in ash. All coals are high-volatile, of A and B bituminous rank, and are mainly common banded except for local thin zones of cannel coal. In 1977 there were 477 underground and surface mines in which more than 5,500 people were employed. Surface mining has a direct onsite effect and often offsite influence on surface soils and land use. Approximately 40,000 acres have been strip mined in Leslie and Perry Counties. Most strip mining has been around the hills or mountaintops. Land use has generally been forestry before mining. Remaining strippable reserves are estimated to be more than 76 million tons. Some soils of Leslie and Perry Counties will continue to be affected by surface mining (*6, 8, 9*).

Oil and gas have potential for economic development. The most active discovery was in the Little Leatherwood Creek area of Perry County in 1977. Production wells of both oil and gas are drilled to a depth of approximately 3,200 feet. In Leslie County, gas production from the Hyden west field serves the needs of Somerset in Pulaski County.

Sand and gravel are used locally and generally obtained from the alluvium along main streams. Quantity is ample, but quality is generally poor because of the large amount of shale and coal.

climate

Prepared by the National Climatic Center, Asheville, N.C.

Winters are cold and snowy in Leslie and Perry Counties. The soils in narrow valleys and on cool slopes stay frozen most of the winter, but intermittent thawing of soils is more frequent on warm slopes and ridges. Summers are fairly warm on mountain slopes and very warm with occasional hot days in the valleys. Rainfall is evenly distributed, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. Normal annual precipitation is adequate for all crops, although summer temperature and growing season length, particularly at higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Hyden, Ky., from 1962 to 1977. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34° F, and the average daily minimum temperature is 23°. The lowest temperature on record, which occurred at Hyden, Ky., on January 18, 1977, is -13°. In summer the average temperature is 73°, and the average daily maximum temperature is 85°. The highest recorded temperature, which occurred at Hyden on July 15, 1966, is 98°

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40° F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 50 inches. Of this, 25 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 23 inches. The heaviest 1-day rainfall during the period of record was 3.95 inches at Hyden on March 12, 1963. Thunderstorms occur on about 50 days each year, and most occur in summer.

Average seasonal snowfall is 17 inches. The greatest snow depth at any one time during the period of record was 9 inches. On an average of 13 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 12 miles per hour, in winter.

Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability or potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Combs loam is one phase in the Combs series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Grigsby-Rowdy complex, 0 to 6 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Shelocta-Cutshin association, steep, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Fairpoint soils, steep, benched, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

This survey does not include a section on general soil map units because the scale of mapping is rather large and the soils are used mainly for mining and forestry. The soils on bottoms are in areas too small to show on a general soil map. Most of the soils are on mountains and occur in a regular pattern in only three of the detailed map units. Figures 3, 4, and 5 in this section are block diagrams showing typical patterns of the major soils in these three units.

Descriptions of the soils in the detailed map units follow.

Co—Combs loam. This deep, well drained, nearly level or gently sloping soil is on low terraces along major streams. This soil is flooded frequently for brief periods late in winter or early in spring. Slopes range from 0 to 4 percent. Areas range from 5 to 50 acres.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is dark brown loam about 15 inches thick. The subsoil extends to a depth of 80 inches or more. It is dark yellowish brown fine sandy loam in the upper 21 inches and yellowish brown loam in the lower part.

This soil is moderate in natural fertility and organic matter content. Reaction is neutral to medium acid throughout. Permeability is moderate to moderately rapid, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by roots.

Included with this soil in mapping are small areas of soils that have a surface layer of silt loam and a silty clay loam subsoil. Also included are soils that have a brownish, acid clay subsoil and are on high terraces and soils that have slopes of 4 to 12 percent and are in narrow areas near banks of streams. Small areas of Grigsby soils are also included. These inclusions make up about 20 to 30 percent of this map unit, but an individual area of an included soil is generally less than 5 acres.

Most of the acreage of this Combs soil is used for cultivated crops, hay, and pasture. Good tilth is easily maintained. Some areas are subject to erosion by floodwaters; in these areas grassed waterways or permanent vegetation are needed for protection.

Although most of this soil has been cleared, it is well suited to trees. Yellow-poplar, black walnut, black cherry, and eastern white pine are suitable trees to plant for commercial production. Plant competition is a management concern.

Most of this soil has severe limitations for urban uses because of flooding. Some small areas of soils on stream terraces and colluvial fans above the flood plains have few limitations for urban uses.

This Combs soil is in capability class I and in woodland suitability group 1o.

DLF—Dekalb-Rock outcrop-Latham association, steep. This map unit consists of moderately deep, well drained soils, Rock outcrop, and moderately deep, moderately well drained soils. These soils are on ridges and upper side slopes of mountains (fig. 1), and they also extend toward the valley from points along the ridges. Relief is quite regular. Ridgetops average 600 to 800 feet above the valley floor. Slopes range from 15 to 70 percent but average about 50 percent. These soils are in a somewhat regular pattern, but it was not practical to map them separately because use and management are similar. Areas are narrow and elongated and range from 20 to more than 100 acres.

Dekalb soils make up about 50 percent of the association and are commonly on upper side slopes of steep mountains. Rock outcrop makes up about 25 percent of the unit. It consists of cliffs, chimney rocks, and steep ledgy slopes of horizontally bedded sandstone, siltstone, and shale irregular in thickness. Latham soils make up about 15 percent of the unit and are commonly on points, benches, and saddles of upper

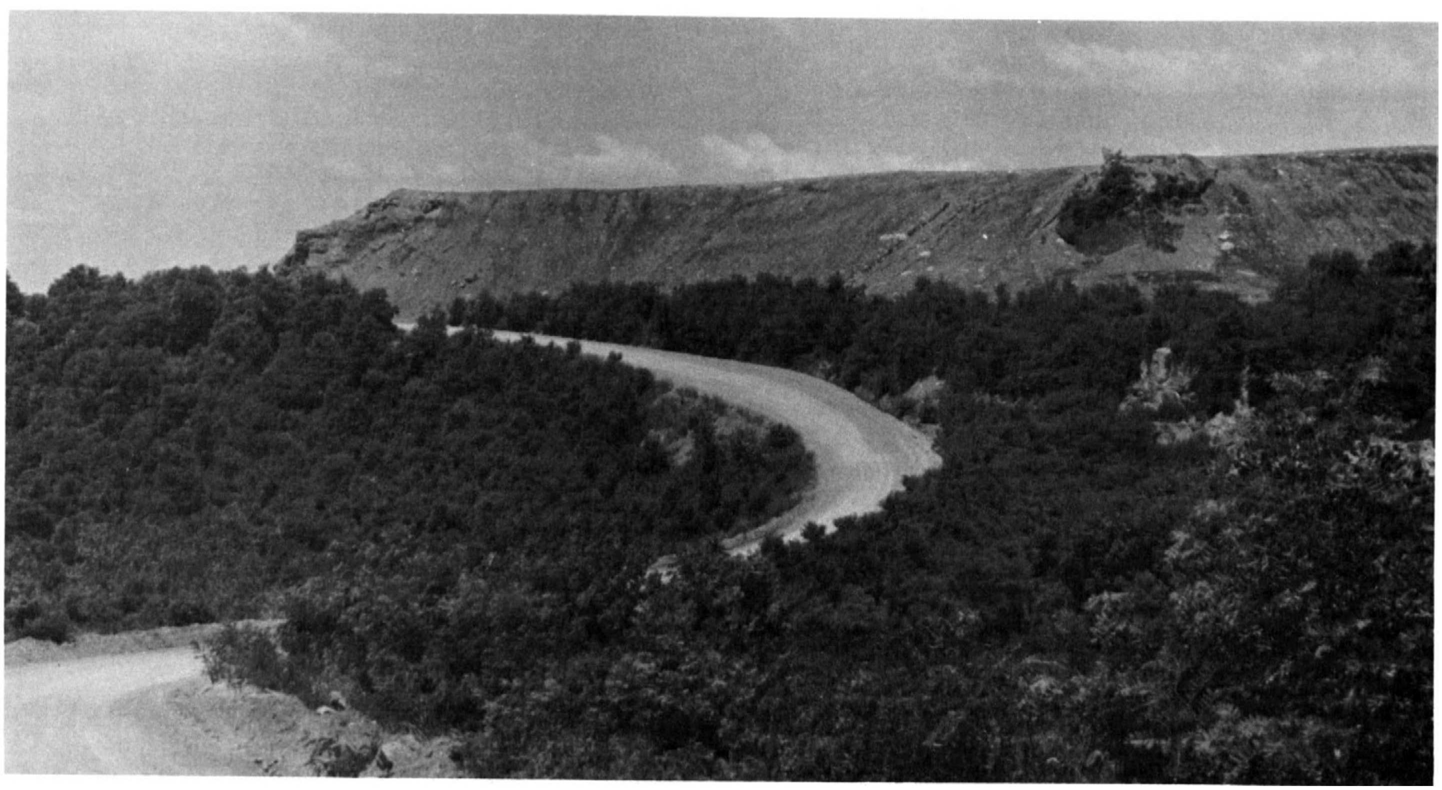


Figure 1.—An area of Dekalb-Rock outcrop-Latham association, steep, in the foreground, and a mountaintop after surface mining, in the background.

side slopes of steep mountains. Other soils make up about 10 percent of the map unit.

Typically, the surface layer of Dekalb soils is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown channery loam about 32 inches thick. It is underlain by sandstone bedrock at 34 inches.

Dekalb soils have moderately rapid to rapid permeability. The available water capacity is low, and reaction is extremely acid to strongly acid in the subsoil.

Typically, the surface layer of Latham soils is dark brown silt loam about 3 inches thick. The subsoil, which extends to a depth of about 33 inches, is yellowish brown or strong brown silty clay loam or silty clay. The underlying material is soft shale.

Latham soils have slow or very slow permeability, and the available water capacity is moderate. Reaction is strongly acid to extremely acid in the subsoil, and the shrink-swell potential is moderate.

Included in mapping are mainly deep, well drained, very channery or very flaggy loamy soils; shallow sandy or shaly soils; and deep, moderately well drained, clayey soils. Also included are small areas of soils that are less acid in the subsoil and deeper to bedrock than Dekalb soils. Included in mapping are some soils that have slopes of 2 to 15 percent and are on narrow ridgetops and crests.

These Dekalb and Latham soils are not suited to cultivated crops, pasture, and most urban uses because they have steep slopes and surface stones and are intermingled with Rock outcrop.

Most of the acreage of these soils is in second growth hardwoods. Common trees in the overstory include scarlet oak, chestnut oak, black oak, mockernut hickory, shagbark hickory, and pignut hickory; less common are white oak, northern red oak, and black locust. Stands of pitch pine, Virginia pine, and shortleaf pine are scattered over the soils in the map unit. In places the understory consists of red maple, sassafrass, sourwood, magnolia, flowering dogwood, blackgum, and American beech. The ground species commonly include azalea, mountain-laurel, huckleberry, teaberry, trailing arbutus, orchids, lilies, blackberry briers, and greenbriers.

These soils are suited to trees. Suitable trees for planting include eastern white pine, shortleaf pine, and Virginia pine. Equipment use limitations, the hazard of erosion, and seedling mortality are major woodland management concerns. Other concerns are the smallness of tracts of woodland, limited access roads, fire control, and in places, infestations of the southern pine beetles.

The soils in this map unit have fair potential for woodland wildlife habitat. The most common game species are the gray squirrel and woodchuck. In places, fox and deer are common. Grouse use the ridges and points for feeding, cover, and drumming.

Recreation activities are generally hunting, hiking, and studying nature.

The soils in this map unit are in capability subclass VIIs. Dekalb soils are in woodland suitability group 3r, and Latham soils are in woodland suitablity group 3c (north slope) and 4c (south slope).

FaB—Fairpoint soils, undulating. These deep, well drained, undulating soils are on ridgetops and broad benches. They have been reshaped and reseeded (fig. 2). The soils consist of a mixture of partly weathered fine earth and rock fragments from mountaintop mining operations. The surface layer and the underlying material are variable in kinds and amounts of rock fragments. Areas range from 2 to 50 acres or more. Slopes are dominantly 2 to 10 percent but may range from 0 to 25 percent.

Typically, the surface layer, usually compacted, is mixed, dark grayish brown and light brownish gray channery silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is brownish gray and grayish brown mixed with yellowish brown or gray channery silt loam, loam, or silty clay loam.

These soils have a deep root zone. Permeability is moderately slow, and surface runoff is slow to rapid. The available water capacity is low. Reaction is medium acid to neutral. Natural fertility and organic matter content are low. Rock fragments or stones and, in places, steep slopes restrict the use of tillage implements.

Included with these soils in mapping are small areas of soils formed in regolith from sandstone and shale, which are very strongly acid to extremely acid. Also included are small areas of steep soils, mounds of soils, and areas of soils that have not been reshaped or reseeded, which are variable in spoil content, slope, and surface stones. Inclusions make up about 15 percent of this map unit.

Most areas of these Fairpoint soils have been reseeded to grasses or legumes or both. Plantings of black locust and pine are common, and some areas have revegetated naturally.

These soils are not suited for cultivated crops. They have moderate to severe limitations for urban uses because of large stones, differential settling, moderate shrink-swell potential, and slow permeability.

These soils are suited to pasture and hay. Most grasses and legumes grown in the area are suited to these soils. Coarse fragments and large stones restrict the use of tillage implements, and irregular settlement of the surface occurs in places. Vegetative treatment for these soils should provide for a quick, protective, and permanent cover. In seeding the areas, the spoil should be graded smooth enough for equipment to be used in planting, harvesting, and maintaining the plants. Fertilizer and lime should be applied.

These soils are suitable for trees. Eastern white pine, black locust, yellow-poplar, shortleaf pine, and Virginia pine are the preferred trees. Good quality plant stock is required for maximum survival and growth. Seedling mortality is a management concern on these soils, and on the included steep soils, the erosion hazard is severe and there are severe limitations to equipment use.

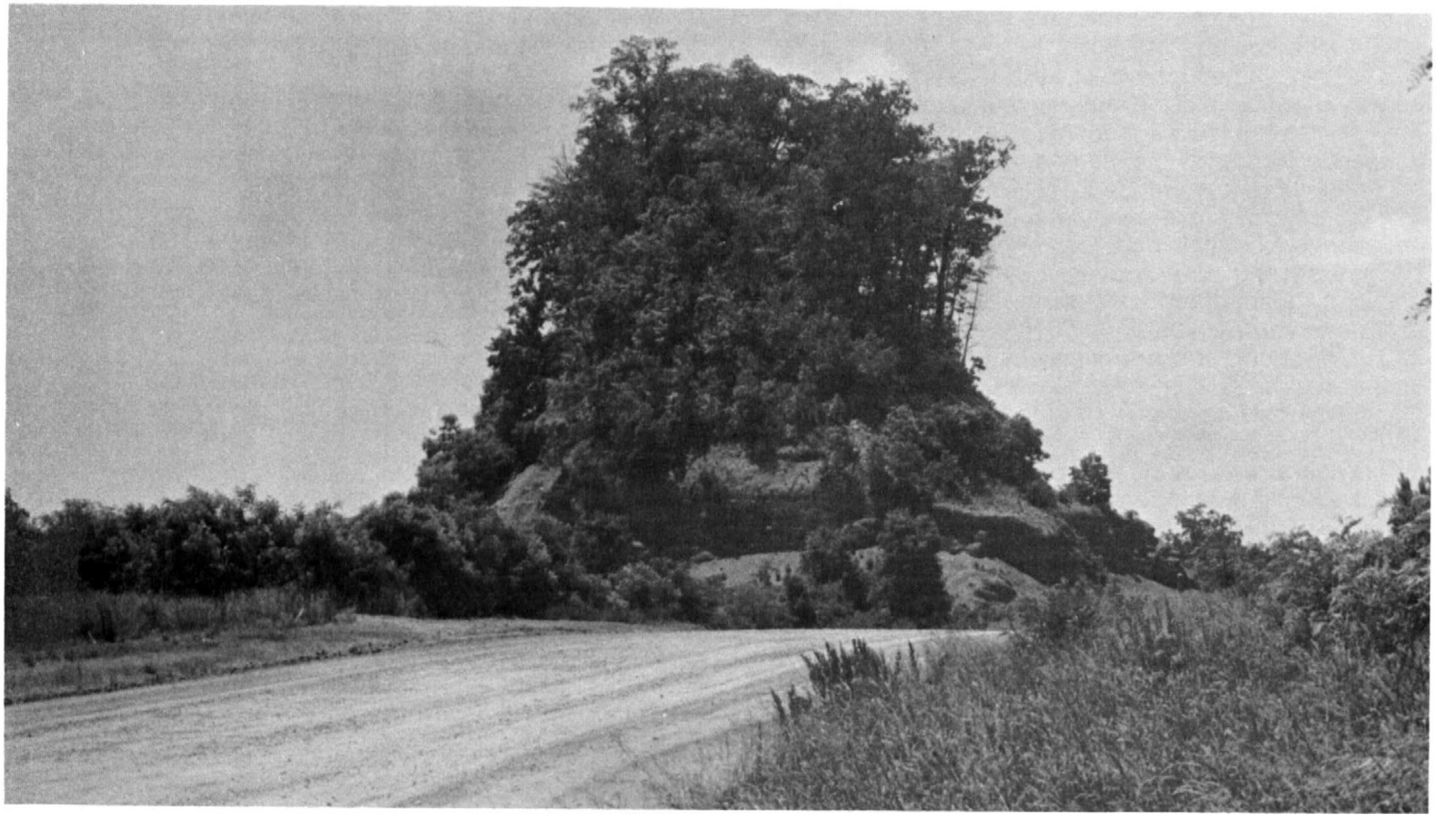


Figure 2.—A section of a ridgetop after surface mining. The coal under such areas is usually removed by an auger.

Areas of these soils that are graded, reseeded, and planted to either herbaceous or woody plants have potential as wildlife habitat. Plants that provide vegetative cover for controlling soil erosion also provide food and protective cover for wildlife. Strip plantings of herbaceous plants or trees are more attractive than solid plantings. Fertilizer should be applied, and spots that failed to become vegetated should be reseeded and replanted.

These Fairpoint soils are in capability unit VIs. They are not assigned to a woodland suitability group.

FaF—Fairpoint soils, steep, benched. These deep, well drained, steep soils are on narrow benches, on mine outslopes, and in filled in hollows (fig. 3). They consist of spoil from surface mines and are a mixture of partly weathered fine earth and rock fragments. The surface layer and the underlying material are variable in kind and amount of rock fragments. Large boulders or stones are scattered at random over the surface of this unit. Areas range from 5 to 100 acres or more. Slopes range from 2 to 70 percent but average about 35 percent. Soils on benches have slopes of 2 to 10 percent and make up about 15 percent of the map unit, and about 70 percent of the unit is steep.

Typically, the surface layer is mixed grayish brown and brownish gray channery silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is brownish gray and grayish brown mixed with yellowish brown or gray channery loam, silt loam, or silty clay loam. The surface layer on benches is usually compacted.

These soils have a deep root zone. Permeability is moderately slow, and surface runoff is slow to rapid. The available water capacity is low. Reaction ranges from medium acid to neutral. Natural fertility and organic matter content are low. The shrink-swell potential is moderate.

Included with these soils in mapping are small areas of soil formed in regolith from sandstone and shale, which are very strongly acid to extremely acid. Also included are small areas of spoil from deep mine operations, areas of fill soil brought in during road construction, and small undisturbed areas. Inclusions make up about 15 percent of this map unit.

Most of the recently disturbed areas of these Fairpoint soils have been reshaped and seeded to grasses and legumes or planted to black locust or pine. Some of the older areas have revegetated naturally. These soils are suited to most grasses and legumes grown in the area; however, in some areas plants are difficult to establish and maintain. Steep slopes and coarse fragments restrict the use of tillage implements. Erosion and slides are

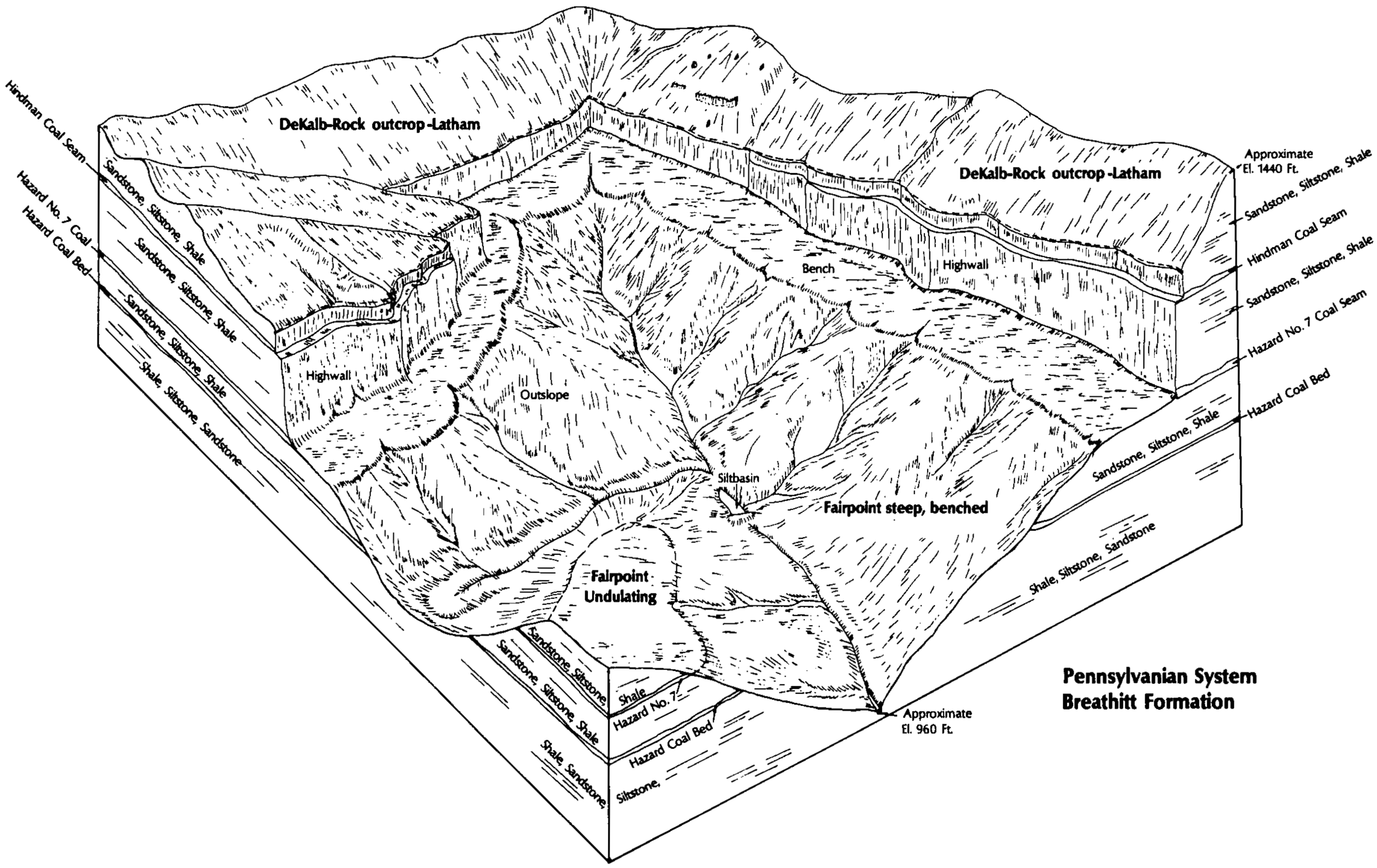


Figure 3.—Typical pattern of soils and underlying material, mainly Fairpoint soils and Dekalb-Rock outcrop-Latham association, steep, soils in a surface-mined area.

severe problems on mine outslopes, and irregular settling of the soil occurs in places.

Revegetation of these soils should provide for a quick, protective, and permanent cover. Before seeding the smoother bench areas, the spoil should be graded enough to permit equipment use in planting and harvesting. Seed and fertilizer and lime, if needed, should be applied in adequate amounts.

In the steeper areas, herbaceous vegetation should be established along with tree seedlings for erosion control. Usually, trees alone will not have enough growth to control erosion for 5 to 10 years. Good quality seed and planting stock are required for maximum survival and growth. Black locust, eastern white pine, Virginia pine, yellow-poplar, and shortleaf pine are suited to these soils, especially on the cool aspects.

The potential for wildlife habitat is poor or very poor. The preferred pattern of planting for wildlife consists of strips of either herbaceous plants or trees, or both, and shrubs. Where strip plantings are not possible or practical, solid plantings of either herbaceous or woody plants are beneficial to wildlife.

These soils have severe limitations for most urban uses because of steep slopes, slow permeability, shrink-swell potential, differential settling, and slides or slippage.

These Fairpoint soils are in capability subclass VIIe. These soils are not assigned to a woodland suitability group.

Gr—Grigsby-Rowdy complex, 0 to 6 percent slopes. This map unit consists of areas of deep, well drained, nearly level to gently sloping Grigsby and Rowdy soils that are so intermingled that to separate them in mapping was not practical. The Grigsby soils are on the flood plains, and the Rowdy soils are on low terraces.

Grigsby soil has slopes of 0 to 4 percent and makes up about 60 percent of this map unit. Typically, the surface layer is brown loam about 7 inches thick. The subsoil is dark yellowish brown loam that extends to a depth of about 48 inches. The underlying material is dark yellowish brown loam that has thin strata of sandy loam.

Grigsby soil is medium in natural fertility and organic matter content. Permeability is moderate to moderately rapid, and available water capacity is high. Reaction ranges from medium acid to neutral in the surface layer and subsoil and from strongly acid to neutral in the underlying material. The root zone is deep. Grigsby soil is frequently flooded.

Rowdy soil has slopes of 2 to 6 percent and makes up about 25 percent of this map unit. Typically, the surface layer is brown loam about 7 inches thick. The upper 12 inches of the subsoil is dark yellowish brown loam. The lower part of the subsoil extends to a depth of about 50 inches and is yellowish brown loam. The underlying material is yellowish brown loam that has a few grayish mottles.

Rowdy soil is medium in natural fertility and organic matter content. Permeability is moderate. The available water capacity is high. Reaction ranges from very strongly acid to medium acid. The root zone is deep. Rowdy soil is rarely flooded.

Included in mapping are small areas of deep, well drained, gravelly soils on colluvial fans; somewhat poorly and poorly drained soils on wet spots; and deep, well drained, acid soils on high terraces. Small areas of gravelly soils are common on the flood plains and the low terraces. These included soils make up about 15 percent of the map unit.

These Grigsby and Rowdy soils are used for cultivated crops, hay, and pasture. Many areas are idle. The soils are suited to crops commonly grown in the area, and crops respond well to fertilizer and lime. Returning crop residue to the soil, using cover crops, and including grasses and legumes in the cropping system help to maintain soil tilth and organic matter content.

All the pasture and hay crops commonly grown in the area are suited to these soils, but some hay crops in low areas may be damaged by flooding.

Although most of these soils are cleared, they are well suited to trees. Yellow-poplar, black walnut, and eastern white pine are the preferred trees. Plant competition is a management concern.

The potential for wildlife habitat is good.

Although much of the urban development has occurred along the streams, these soils have severe limitations for most urban uses because of flooding. Grigsby soil on flood plains is frequently flooded, and Rowdy soil on low terraces is rarely flooded. The included soils that are on high terraces and alluvial fans are not flooded and are suited to home sites and other urban uses.

These Grigsby and Rowdy soils are in capability class I and in woodland suitability group 1o.

SCF—Shelocta-Cutshin association, steep. This map unit consists of deep, well drained, steep soils on mountainsides, in coves, and on benches (fig. 4). The soils are in a regular pattern, chiefly on northeasterly aspects. Shelocta soils are on smooth side slopes, and Cutshin soils are in most coves and on benches. Relief is quite regular, and ridgetops are usually 600 to 800 feet above the valley floor. Slopes range from 15 to 60 percent but average about 40 percent. Areas are long and are irregularly dissected by drainageways in a dendritic pattern.

Shelocta soils make up about 60 percent of the association, Cutshin soils about 25 percent, and other soils about 15 percent.

Typically, the surface layer of Shelocta soils is brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of 17 inches, is dark yellowish brown silt loam. The lower part, to 60 inches, is strong brown channery or shaly silty clay loam. The underlying material to a depth of 72 inches or more is strong brown channery loam. In places the surface layer is gravelly, channery, or flaggy.

Shelocta soils have moderate permeability. The available water capacity is high. Reaction of the surface layer and upper part of the subsoil ranges from medium acid to very strongly acid. Reaction of the lower part of the subsoil and the underlying material ranges from strongly to very strongly acid. The root zone is deep. Natural fertility and organic matter content are medium.

Typically, the surface layer of Cutshin soils is channery loam about 19 inches thick. It is very dark grayish brown in the upper 10 inches and dark brown in the lower 9 inches. The subsoil is yellowish brown channery loam to a depth of about 50 inches. The underlying material is soft siltstone. In places the surface layer is gravelly, channery, or flaggy.

The Cutshin soils have moderate permeability. The available water capacity is high. Reaction of the surface layer ranges from medium acid to neutral. The subsoil ranges from medium acid to very strongly acid. The root zone is deep. Natural fertility and organic matter content are high.

Included in mapping are small areas of Gilpin, Latham, Rowdy, and Grigsby soils as well as areas of Rock outcrop. There are also small areas of shallow soils that have a sandy loam subsoil or have more than 35 percent coarse fragments. In places these shallow soils are similar to the Cutshin soils except that they have a high base saturation.

Most of the acreage of these Shelocta and Cutshin soils is in second growth hardwoods. Because of steep slopes, a hazard of erosion, and surface stones, these soils are not suitable for cultivated crops, pasture, or urban uses. They are, however, well suited to woodland, wildlife habitat, and some recreation uses. Because the surface layer of Cutshin soils is high in organic matter, they are better suited to timber production than the Shelocta soils.

Suitability for woodland also depends on aspect, or direction the slope faces. Where soils have a northeasterly aspect, they are well suited to very well suited to woodland. The best soils have slopes that face

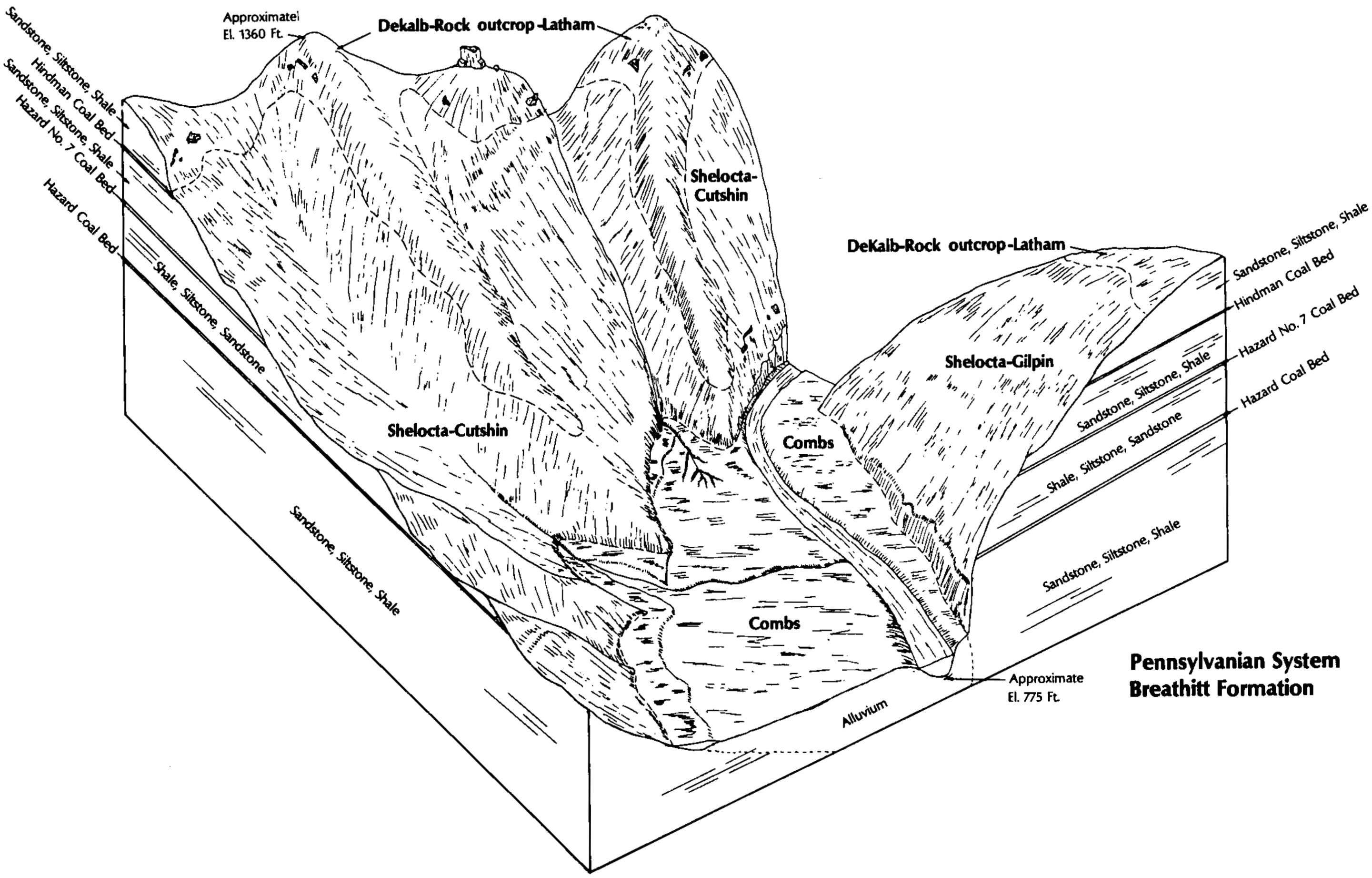


Figure 4.—Typical pattern of major soils and underlying material along the North Fork of the Kentucky River.

northeast, and the poorer soils deviate the most from this aspect. Northeast-facing slopes receive less direct sunlight than others and have lower soil and air temperatures, which, in turn, leads to less loss of soil moisture through evaporation and transpiration.

The overstory vegetation on these soils is mainly nearly pure stands of second growth yellow-poplar and mixed stands of mesophytic hardwoods. Where land was once cultivated, as were some areas in coves, yellow-poplar is the dominant tree. As a result of past management, stands of American beech and oaks frequently occur on these soils. On the lower and colder slopes, isolated stands of eastern hemlock and American beech occasionally dominate. Black willows, American sycamore, boxelder, and river birch are common along streams. Mixed stands of yellow-poplar, sugar maple, red maple, black oak, white oak, northern red oak, black walnut, cucumbertree, mockernut hickory, shagbark hickory, pignut hickory, white ash, black cherry, American elm, slippery elm, sweet birch, and blackgum are in areas that have been cleancut or heavily logged. These trees are well adapted to these soils and, with good management, high yields can be expected.

Woodland management concerns are equipment use limitations, plant competition, the hazard of erosion, forest fire control, and proper stocking. Soils that have slopes of about 20 percent are on narrow benches throughout the association. These benches are easily adapted for use as access roads.

In addition to those trees in the overstory, black locust, Fraser magnolia, bigleaf magnolia, umbrella magnolia, American holly, ironwood, sourwood, flowering dogwood, hornbeam, butternut, and yellow buckeye are common. Throughout the understory on these soils, there are many kinds of mesophytic plants. Mountain-laurel, rhododendron, spicebush, strawberry-bush, buffalo-nut, flame azalea, alder, hazelnut, elderberry, American holly, and serviceberry are common shrubs. A host of ferns and wild flowers, including some of the rare and beautiful orchids and lilies, grow well on these soils (*19*). Many of the plants used as medicinal herbs, food, and flavoring agents, such as ginseng, bloodroot, yellowroot, wild ginger, and jack-in-the-pulpit, grow on these soils.

The potential for woodland wildlife habitat is good. The mixed hardwood stands assure a stable food supply despite cyclic fluctuations in mass production by individual species. The habitat on these soils provides excellent food, cover, and water for gray squirrel, ruffed grouse, raccoon, opossum, fox, woodchuck, and an occasional rabbit. Deer and turkey numbers are very low. Overstory trees such as oaks, walnuts, and American beech provide overwintering food, and dogwood, blackberry, raspberry, grape, mapleleaf viburnum, hazelnut, huckleberry, teaberry, partridgeberry, strawberry-bush, ferns, and pawpaws provide the bulk of the understory food. Pines provide winter cover, and young stands of pines and hardwoods provide escape cover.

Recreation is usually hunting and nature hiking.

Because of steep slopes, most of this association is unsuited for most urban uses.

These Shelocta and Cutshin soils are in capability subclass VIIe. Shelocta soils are in woodland suitability group 2r, and Cutshin soils are in woodland suitability group 1r.

SGF—Shelocta-Gilpin association, steep. This map unit consists of deep and moderately deep, well drained, steep soils on mountainsides. These soils are in a regular pattern, chiefly on southwesterly aspects (fig. 5). Shelocta soils have both concave and convex slopes, and Gilpin soils have dominantly short, steep slopes. Relief is quite regular, and ridgetops are usually 600 to 800 feet above the valley floor. Slopes range from 15 to 60 percent but average about 40 percent. Areas are long and irregular in shape and are dissected by drainageways in an irregular dendritic pattern. Areas range from 50 to more than 100 acres.

Shelocta soils make up about 60 percent of the association, Gilpin soils make up about 20 percent, and other soils make up about 20 percent.

Typically, the surface layer of Shelocta soils is brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 17 inches, is dark yellowish brown silt loam. The lower part, to 60 inches, is strong brown channery or shaly silty clay loam. The underlying material to 72 inches is strong brown channery loam. In places the surface layer is gravelly, channery, or flaggy.

Shelocta soils have moderate permeability. The available water capacity is high. Natural fertility and

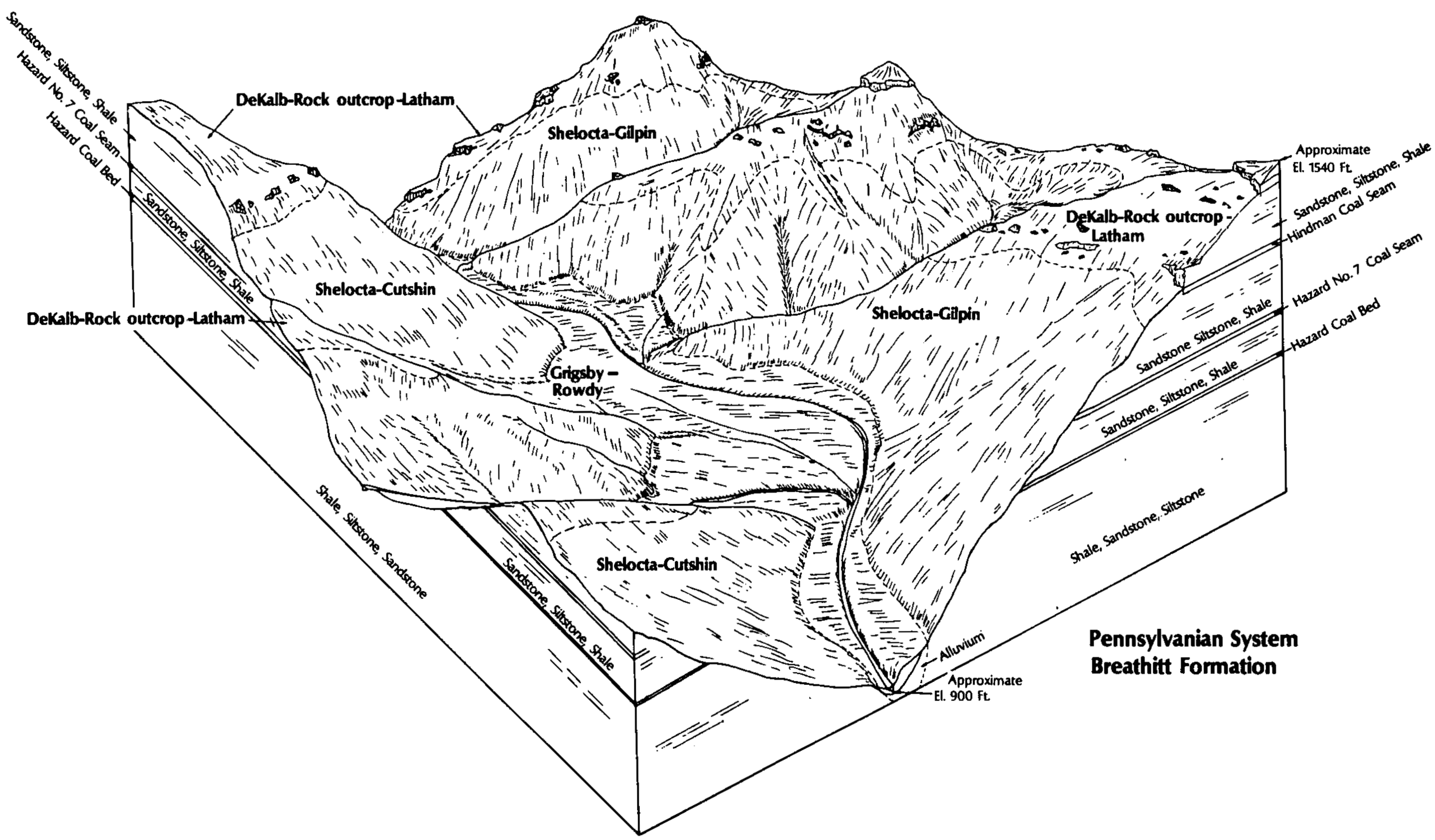


Figure 5.—Typical pattern of soils and underlying material of Shelocta-Gilpin association, steep, soils; Shelocta-Cutshin association, steep, soils; and Dekalb-Rock outcrop-Latham association, steep, soils.

organic matter content are medium. Reaction of the surface layer is medium acid to very strongly acid. The root zone is deep.

Typically, the surface layer of Gilpin soils is dark yellowish brown channery silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown channery silt loam, and the lower part is strong brown silt loam. Thin bedded shale bedrock is at a depth of about 36 inches.

Gilpin soils have moderate permeability. The available water capacity is moderate. Natural fertility and organic matter content are medium. The reaction is extremely acid or strongly acid throughout. The root zone is moderately deep.

Included in mapping are small areas of Cutshin, Dekalb, and Latham soils and narrow bands of Rock outcrop. Also included is a soil similar to the Gilpin soils except that it is underlain by clayey shale. There are also small areas of deep, well drained, loamy and loamy-skeletal soils and shallow shaly and sandy soils. Included soils make up about 20 percent of the map unit.

Most of the acreage of these Shelocta and Gilpin soils is in second growth hardwoods. Because of steep slopes, hazard of erosion, and surface stones, these soils are not suitable for cultivated crops, pasture, or urban uses. They are, however, suited to woodland, wildlife habitat, and some recreation uses. Because of a moderate depth to bedrock, Gilpin soils are somewhat less suited to woodland than Shelocta soils.

Suitability for woodland also depends on aspect, or direction the slope faces. Where the soils have southwesterly aspect, they are moderately well suited to woodland. Within this map unit, the poorest soils generally have slopes that face southwest; and the greater the deviation from this aspect, the better the soils. Southwest-facing slopes receive more direct sunlight and have warmer soil and air temperatures than others, which results in a greater loss of soil moisture through evaporation and transpiration (*7*). Position on the landscape also affects suitability. The uppermost positions receive more sunlight and are less suitable for woodland. Vegetation on these soils is mainly a mixed oak-hickory forest that has small scattered stands of yellow-poplar and pine. American beech stands are also significant in places, depending upon past management.

Common trees in the overstory are black oak, white oak, scarlet oak, mockernut hickory, shagbark hickory, pignut hickory, chestnut oak, northern red oak, red maple, American beech, yellow-poplar, shortleaf pine, pitch pine, Virginia pine, and blackgum.

Scarlet oak, chestnut oak, shortleaf pine, and pitch pine are usually on the uppermost and drier soils. Northern red oak, red maple, blackgum, American beech, and yellow-poplar are on soils in the lower, moist positions. White oak, Virginia pine, mockernut hickory, shagbark hickory, and pignut hickory are throughout this map unit. In the understory, chestnut oak, scarlet oak, teaberry, trailing arbutus, and huckleberry are generally on the upper, drier soils. American beech, yellow-poplar, red maple, sugar maple, blackgum, sourwood, dogwood, poison ivy, grapevine, and Christmas fern are on lower, moist soils of the map unit. Throughout the understory on both dry and moist soils of this unit are black oak, mockernut hickory, shagbark hickory, sassafras, white oak, pignut hickory, mountain-laurel, striped pipsissiwa, greenbrier, and buffalo nut.

Eastern white pine, shortleaf pine, and Virginia pine are the preferred trees for these soils. These trees are better adapted to more adverse soil conditions and should be favored over yellow-poplar and other hardwoods. Major management concerns are fire control, proper tree stocking, hazard of erosion, equipment use limitations, and in places, Southern pine beetle control. Soils that have slopes of about 20 percent are on narrow benches throughout the map unit. They serve as access roads.

These soils have good potential for woodland wildlife habitat. The most important game species is the gray squirrel. The mixed stands of oak, hickory, and beech are ideal for a high squirrel population. The variety of tree species in these stands assures a more stable supply of nests. Mast production is also important for a good deer population because mast is their primary overwintering food. Grouse populations are good in some areas, and they depend on such foods as flowering dogwood, teaberry, mountain-laurel, American beech, ferns, oak, greenbrier, and huckleberry.

Recreation is generally hunting and nature hiking.

These Shelocta and Gilpin soils are generally unsuited to most urban uses because of steep slopes.

These soils are in capability subclass VIIe and in woodland suitability group 3r.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce high yields of crops when it is treated and managed with acceptable farming methods. Prime farmland produces high yields with minimal inputs of energy and economic resources, and farming this soil results in the least damage to the environment.

Prime farmland may be in crops, pasture, woodland, or other land uses, but not urban built-up land or water areas. The soil must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation. It also has favorable temperature and growing season, acceptable acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland consult the local Soil Conservation Service.

About 7,420 acres, or less than 2 percent, of Leslie and Perry Counties soils is prime farmland. These areas are along the rivers and major tributary streams. Most of the crops grown in this survey area are on this land, namely tobacco, corn, and horticulture crops. Recent industrial and urban developments are on some areas of prime farmland. The map units that meet the soil requirements for prime farmland, except where the use is urban or built-up land, are:

Co—Combs loam.
Gr—Grigsby-Rowdy complex, 0 to 6 percent slopes.

Some areas of these soils are subject to frequent flooding and would not qualify for prime farmland unless protected from flooding. An onsite evaluation is necessary to determine whether the limitations have been overcome. Urban or built-up land is defined to be any contiguous unit of land 10 acres or more in size that is used for residences, industrial sites, commercial sites, construction sites, institutional sites, public administrative sites, railroad yards, small parks, cemeteries, airports, golf courses, spillways, shooting ranges, and so forth.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor-does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs (*14*).

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

Charles A. Foster, forester, Soil Conservation Service, assisted in preparing this section.

Leslie and Perry Counties are situated in the mixed mesophytic forest region of eastern Kentucky. Forests occupy 251,000 acres, or 94 percent, of the land area in Leslie County and 201,000 acres, or 88 percent, of the land area in Perry County (*17*). Of several forest types found in these counties (*5, 11*), the oak-hickory is the most extensive, comprising some 283,000 acres in both counties.

Much of the forest land is in small private holdings averaging 22 acres. The Daniel Boone National Forest includes 51,502 acres in Leslie County, and these have multiple uses.

Privately owned forest land in eastern Kentucky grows an average of 30.9 cubic feet of wood per acre per year. Growth is well below the potential for most sites. The softwood timber portion of the growing stock averages 2,315 board feet per acre. With proper management, tree growth and quality could be improved. A soil survey is a useful tool that provides soil interpretations for forest management based on soil characteristics such as depth, texture, available water, natural fertility, slope position, and other physical and chemical features.

There are four commercial sawmills in Perry County and six mills in Leslie County. Wood products produced in the counties include rough lumber, cross ties, dimension stock, and timbers (fig. 6).

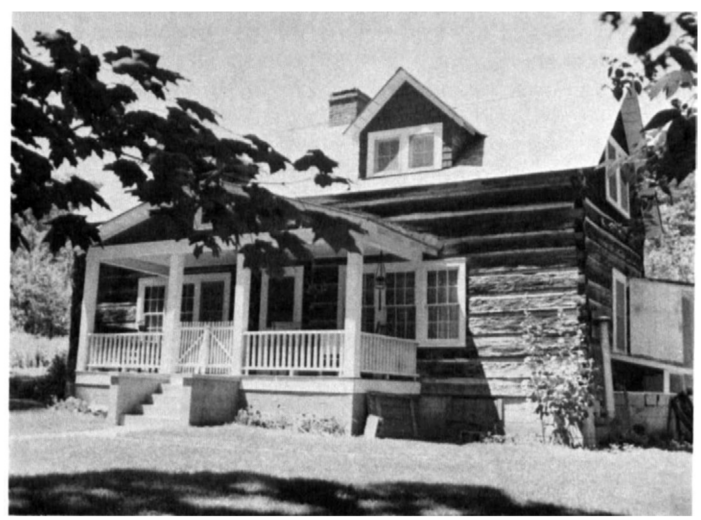


Figure 6.—A log house constructed from logs of mixed hardwoods commonly grown in the survey area.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. The table lists the ordination (woodland suitability) symbol for each soil suitable for production of trees.

Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *c* indicates clay in the upper part of the soil; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: c, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* (*4*). This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

The wildlife population of Leslie and Perry Counties consists of an estimated 40 species of mammals, 60 species of reptiles and amphibians, and 94 species of birds that commonly nest here. During certain seasons, many of the 200 other kinds of birds that visit Kentucky each year can be found in these counties.

Wildlife most important to man are those that furnish recreation in the form of sport hunting or economic gain in the form of commercial trapping. In Leslie and Perry Counties wildlife for such purposes include gray squirrel, white-tailed deer, raccoon, mink, muskrat, cottontail, ruffed grouse, bobwhite quail, wild turkey, woodcock, and red fox.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants (*3*).

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife (*21*). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, bluegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness.

Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are waterfowl feeding areas and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations before design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas, and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders and organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cut banks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as sodium. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas (*15*). Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GM, GC, SM, and SC; silty and clayey soils as ML, CL, and CH. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SM-SC.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent.

Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability (*12*) is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; and *moderate*, 3 to 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

In table 15, the estimated content of *organic matter* of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, or *brief* if 2 to 7 days. Probable dates are expressed in months; Dec-May means that flooding can occur during the period December through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either *soft* or *hard*. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

physical and chemical analyses of selected soils

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil series and their morphology." Soil samples were analyzed by the Kentucky Agricultural Experiment Station.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (*16*).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all materials less than 75 mm (3B1).
Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) by difference, weight percentages of all materials less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).
Organic carbon—dichromate, ferric sulfate titration (6A1a).
Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (6O2), sodium (6P2), potassium (6Q2).
Extractable acidity—barium chloride-triethanolamine I (6H1a).
Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).
Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1a).
Reaction (pH)—potassium chloride (8C1c).
Available phosphorus—Procedure (6S6) Ky. Agri. Expt. Sta.
Field sampling— site selection (1A1).
Field sampling— Soil Sampling (1A2).
Laboratory Preparation— Standard (air dry) Material (1B1).
Particles < specified size > 2 mm—(2A2).
Particles < 2 mm—(2A1).
Particles greater than 2 mm—field or laboratory weighing (3b1a).
Extractable bases—(5B1a).
Exchangeable acidity (H+Al)—Yuan procedure 67-3.52, Part 2, Methods of Analysis, ASA, 1965.
Calcium carbonate equivalent—procedure (236b) USDA Handbook 60, USDA Salinity Laboratory 1954 (6N7).

engineering index test data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and their morphology." The soil samples were tested by the Division of Research, Bureau of Highways, Department of Transportation, Commonwealth of Kentucky.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*18*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 20, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning udic water regime, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that have an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*13*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*18*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Combs series

The Combs series consists of deep, well drained soils. These soils formed in alluvium washed chiefly from soils formed from weathered sandstone, siltstone, and shale and also from soils formed in residuum of limestone. Permeability is moderate to moderately rapid. These soils are on low stream terraces and along major streams, and they have slopes ranging from 0 to 4 percent. The soils of the Combs series are coarse-loamy, mixed, mesic Fluventic Hapludolls.

Combs soils are associated with soils of the Cutshin, Gilpin, Grigsby, Rowdy, and Shelocta series. The

Cutshin, Gilpin, and Shelocta soils are on adjacent steep mountainsides. Grigsby soils are on flood plains and do not have a mollic epipedon. Rowdy soils do not have a mollic epipedon. They are similar to Combs soils in position on the landscape but are along smaller streams.

A typical pedon of Combs loam that has 2 percent slopes, in Perry County, near the mouth of Oldhouse Branch on the North Fork of Kentucky River, about 1.3 miles south of Chavies.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam; moderate medium subangular blocky structure parting to moderate fine granular; very friable; common fine roots and pores; few wormcasts; 2 percent red sandstone fragments about 1 inch to 2 inches across; medium acid; clear smooth boundary.

A12—8 to 23 inches; dark brown (10YR 3/3) loam; moderate medium subangular blocky structure parting to moderate fine granular; very friable; common fine roots; common fine pores; few wormcasts; 4 percent red sandstone fragments about 1 inch to 2 inches across; medium acid; clear smooth boundary.

B21—23 to 44 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate coarse prismatic structure parting to weak medium subangular blocky; friable; few fine roots; common fine pores; nearly continuous coatings or flows on prisms and most pores; thin discontinuous clay films on blocks; slightly acid; gradual smooth boundary.

B22—44 to 64 inches; yellowish brown (10YR 5/6) loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine roots; common fine pores; nearly continuous thin coatings or flows on prisms and in most pores; thin discontinuous clay films on blocks; slightly acid; gradual smooth boundary.

B23—64 to 80 inches; yellowish brown (10YR 5/6) loam; moderate very coarse prismatic structure parting to weak medium subangular blocky; common fine pores; continuous coatings or flows on prisms and in most pores; thin discontinuous clay films on blocks; slightly acid.

Solum thickness is more than 40 inches, and depth to bedrock is more than 60 inches. Thickness of the mollic epipedon ranges from 10 to 24 inches. Reaction ranges from medium acid to neutral throughout. Coarse fragments are commonly lacking but, when present, range up to 5 percent by volume.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is silt loam, sandy loam, loam, or fine sandy loam. Structure is weak or moderate, fine or medium subangular blocky or granular.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, silt loam, sandy loam, or fine sandy loam. It has weak or moderate, fine or medium, subangular blocky structure or coarse prismatic that parts to subangular blocky. Some pedons have a B3 horizon.

Where present, the C horizon is similar in color and texture to the B horizon. Some pedons are stratified, and some are mottled in shades of brown or gray.

Cutshin series

The Cutshin series consists of deep, well drained soils. Permeability is moderate. These soils formed in loamy colluvium weathered from mixed sandstone, siltstone, and shale. The soils are in the lower positions on the mountainsides, on concave side slopes, on benches, and in coves with a cool aspect. Slopes range from 15 to 60 percent but are dominantly about 40 percent. The soils of the Cutshin series are fine-loamy, mixed, mesic Typic Haplumbrepts.

Cutshin soils are associated with Dekalb, Gilpin, Latham, and Shelocta soils. In Dekalb, Gilpin, and Latham soils, depth to bedrock is less than 40 inches. Shelocta soils have an ochric epipedon.

Typical pedon of Cutshin channery loam that has 50 percent slopes with a north aspect, in a convex area of Shelocta-Cutshin association, steep, in Perry County, 500 feet east of Kentucky Highway 267, 2.75 miles northeast of intersection of Kentucky Highways 267 and 15, and about 6 miles north of Hazard.

O1—1 inch to 0; partly decomposed leaf litter.

A11—0 to 10 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine granular structure; very friable; common fine and medium roots; 20 percent thin flat sandstone and siltstone fragments 1/2 inch to 6 inches in length; neutral; clear smooth boundary.

A12—10 to 19 inches; dark brown (10YR 3/3) channery loam; weak fine subangular blocky structure; very friable; common fine and medium roots; 20 percent thin flat sandstone and siltstone fragments 1/2 inch to 6 inches in length; slightly acid; clear smooth boundary.

B21—19 to 30 inches; yellowish brown (10YR 5/4) channery loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common fine pores; few thin patchy clay films; 20 percent thin flat sandstone and siltstone fragments 1/2 inch to 6 inches in length; medium acid; gradual smooth boundary.

B22—30 to 50 inches; yellowish brown (10YR 5/4) channery loam; common fine faint pale brown (10YR 6/3) mottles and coatings on peds; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; few thin patchy clay films; 30 percent thin flat sandstone and siltstone fragments 1/2 inch to 6 inches in length; strongly acid; clear smooth boundary.

Cr—50 to 60 inches; gray and brown soft siltstone.

Thickness of the solum and depth to soft bedrock range from 40 to 80 inches or more. Subrounded and thin flat fragments are mostly sandstone and siltstone. They vary from 1/2 inch to 15 inches across and range in volume from 15 to 35 percent in individual horizons. The A horizon ranges from medium acid to neutral, and the B horizon ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. It is channery, gravelly, or flaggy analogues of loam, fine sandy loam, sandy clay loam, or clay loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 6, and chroma of 3 to 6. It is channery, gravelly, or flaggy analogues of loam, fine sandy loam, clay loam, or sandy clay loam.

Some pedons have a B1 horizon, and others have a B3 horizon or a C horizon with colors and textures like the B2 horizon.

The Cr horizon is soft siltstone, sandstone, or shale. Some pedons have hard rock at a depth of 6 to 10 feet.

Dekalb series

The Dekalb series consists of moderately deep, well drained soils. Permeability is moderately rapid to rapid. These soils formed in material weathered mainly from sandstone but influenced by siltstone, shale, and coal beds. Dekalb soils are on upper side slopes, ridges, and points of mountains. Slopes range from 15 to 70 percent. The soils of the Dekalb series are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Dekalb soils are associated with the Cutshin, Gilpin, Latham, and Shelocta soils. Cutshin and Shelocta soils are deep, well drained soils on mountainsides. Gilpin soils contain more clay, less sand, and fewer coarse fragments than the Dekalb soils. Latham soils formed in clay material weathered from shale.

Typical pedon of Dekalb channery loam on a 50 percent west-facing upper side slope, in an area of Dekalb-Rock outcrop-Latham association, steep, in Leslie County, between Greasy Creek and Lower Bad Creek, about 1 mile east of Hoskinston.

O1—2 inches to 1 inch; recent forest litter.

O2—1 inch to 0; very dark grayish brown (10YR 3/2) partly decomposed organic matter.

A1—0 to 2 inches; dark brown (10YR 4/3) channery loam; weak fine granular structure; many fine to coarse roots; 15 percent coarse fragments of sandstone; medium acid; clear smooth boundary.

B1—2 to 12 inches; yellowish brown (10YR 5/4) channery loam; moderate fine and medium subangular blocky structure; friable; common fine to medium roots; 30 percent thin flat sandstone fragments mostly 3 to 7 inches across; very strongly acid; gradual wavy boundary.

B2—12 to 26 inches; yellowish brown (10YR 5/6) channery loam; weak and moderate medium subangular blocky structure; firm; few medium roots; few fine tubular pores; common fine root channels; 40 percent sandstone fragments; very strongly acid; gradual wavy boundary.

B3—26 to 34 inches; yellowish brown (10YR 5/6) channery sandy loam; weak medium subangular blocky structure; friable; few fine roots; sand grains bridged and coated with clay; 50 percent coarse sandstone fragments; very strongly acid; clear smooth boundary.

R—34 inches; fractured sandstone rock.

Solum thickness and depth to bedrock range from 20 to 40 inches. Sandstone fragments vary in size and amount, but they make up more than 35 percent, weighted average, of the control section. The A horizon ranges from extremely acid to slightly acid, and the B horizon ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 through 4. Texture is channery or flaggy analogues of loam or fine sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. Texture is commonly channery, very channery, or flaggy analogues of loam, fine sandy loam, or sandy loam.

Some pedons have a C horizon that has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. Texture is very channery or very flaggy sandy loam or loamy sand. Coarse fragments may comprise as much as 80 percent, by volume. Underlying bedrock is commonly brown sandstone.

Fairpoint series

The Fairpoint series consists of deep, well drained soils. Permeability is moderately slow. These soils formed in regolith from surface mine operations. Slopes range from 0 to 70 percent. The soils of the Fairpoint series are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Fairpoint soils are geographically associated with the Cutshin, Dekalb, Gilpin, Latham, and Shelocta soils. Cutshin and Shelocta soils have a fine-loamy B horizon and formed from colluvium of sandstone, siltstone, and shale. Cutshin soils have a thick dark surface layer. In Dekalb and Latham soils, depth to bedrock is less than 40 inches. In addition, Dekalb soils are loamy-skeletal and formed mostly from sandstone. Gilpin soils are less than 40 inches deep to bedrock, and they formed in residuum of siltstone, shale, and sandstone. Latham soils are clayey and formed in residuum of shale.

Typical pedon of Fairpoint channery silt loam that has 35 percent slopes, in an area of Fairpoint soils, steep, benched, in Perry County, 300 yards south of Kentucky Highway 28 about 2 miles west of Chavies.

A—0 to 6 inches; mixed dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) channery silt loam; common fine and medium yellowish brown (10YR 5/6), gray (10YR 6/1), and black (N 2/0) bodies of partly weathered sandstone, siltstone, and shale fragments; moderate medium and fine subangular blocky structure; friable; many fine roots; 40 percent coarse fragments that are 45 percent sandstone, 40 percent siltstone and shale, and 15 percent coal and dark shale; fragments are 45 percent less than 3 inches, 15 percent more than 6 inches in diameter; neutral; clear wavy boundary.

C1—6 to 30 inches; mixed dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) channery silt loam; common fine and medium yellowish brown (10YR 5/6), gray (10YR 6/1), and black (N 2/0) bodies of partly weathered sandstone, siltstone, and shale fragments; massive; firm; common fine roots; 40 percent coarse fragments that are 45 percent sandstone, 40 percent siltstone, and 15 percent coal and dark shale fragments, sizes are similar to those in the A horizon; neutral.

C2—30 to 60 inches; mixed dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) channery silt loam; common fine and medium yellowish brown (10YR 5/6), gray (10YR 6/1), and black (N 2/0) bodies of partly weathered sandstone, siltstone, and shale fragments; massive; firm; few roots; 40 percent coarse fragments that are 45 percent sandstone, 40 percent siltstone, and 15 percent coal and dark shale, fragment sizes are similar to those in A horizon; neutral.

Depth to hard rock is 60 inches or more. Reaction ranges from medium acid to neutral. Rock fragments range from 20 to 80 percent, by volume, and average about 40 percent. Coarse fragments are highly variable in kind and amount from place to place.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is gravelly, channery, or shaly analogues of silt loam, loam, silty clay loam, and clay loam.

The C horizon has colors like the A horizon. This horizon is gravelly, very gravelly, shaly, very shaly, channery, or very channery analogues of loam, silt loam, clay loam, or silty clay loam.

Gilpin series

The Gilpin series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in weathered residuum of interbedded siltstone, sandstone, or shale. Slopes range from 15 to 70 percent but are dominantly about 50 percent. The soils of the Gilpin series are fine-loamy, mixed, mesic Typic Hapludults.

Gilpin soils are associated with the Cutshin, Dekalb, Latham, and Shelocta soils. In Cutshin and Shelocta soils, depth to bedrock is more than 40 inches. Dekalb soils have more than 35 percent coarse fragments in the solum. Latham soils formed in fine textured material.

Typical pedon of Gilpin channery silt loam that has 40 percent slopes, in an area of Shelocta-Gilpin association, steep, in Leslie County, about 1.3 miles northeast of the confluence of Owlnest Branch and Middle Fork of the Kentucky River about 2 miles northeast of Hyden.

O1—1 inch to 0; partly decomposed litter from mixed hardwoods.

A1—0 to 4 inches; dark yellowish brown (10YR 4/4) channery silt loam; moderate fine to coarse granular structure; very friable; common fine to medium roots; common wormholes and medium root channels; 15 percent coarse fragments of sandstone; strongly acid; clear smooth boundary.

B21t—4 to 14 inches; yellowish brown (10YR 5/6) channery silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; few wormholes and fine root channels; 15 percent coarse fragments of sandstone, some larger than 3 inches across; strongly acid; gradual wavy boundary.

B22t—14 to 36 inches; strong brown (7.5YR 5/6) silt loam; moderate fine and medium subangular and angular blocky structure; firm; few fine and medium roots in the upper part; common thin clay films; about 10 percent coarse fragments, mostly shale, less than 2 inches across; very strongly acid; clear wavy boundary.

Cr—36 to 44 inches; weathered thin bedded shale.

Solum thickness ranges from 18 to 36 inches. Soft bedrock is at a depth of 20 to 40 inches. Coarse fragments make up from 5 to 40 percent of each horizon. Reaction ranges from strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is gravelly, channery, and shaly analogues of silt loam or loam.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is gravelly, channery, or shaly analogues of silt loam, loam, or silty clay loam. In some pedons a thin B3 horizon lies directly above bedrock.

Some pedons have a C or IIC horizon that has hue of 10YR through 2.5Y, chroma of 4 to 6, and value of 1 to 8. Texture is shaly or very shaly, channery, and very channery analogues of silty clay loam, loam, or silt loam.

Grigsby series

The Grigsby series consists of deep, well drained soils. Permeability is moderate to moderately rapid. These soils formed in recent alluvium on flood plains and are subject to periods of flooding in winter and spring. Slopes range from 0 to 4 percent. The soils of the Grigsby series are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

The Grigsby soils are associated with the Combs and Rowdy soils. The Combs soils have a mollic epipedon. The Rowdy soils are on stream terraces.

Typical pedon of Grigsby loam that has smooth 8 percent slopes, in an area of Grigsby-Rowdy complex, 0 to 6 percent slopes, in Perry County, 4 miles northeast of Hazard, 1.3 miles east of the junction of Kentucky Highways 80 and 1088, on bottom land, and 75 steps north of Lotts Creek.

Ap—0 to 7 inches: brown (10YR 4/3) loam; moderate fine and medium granular structure; very friable; common fine roots; common worm and insect holes with casts and larvae; medium acid; abrupt smooth boundary.

B21—7 to 37 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; very friable; few medium and fine roots; common wormholes with casts; few pebbles, coal fragments, horizontally bedded thin flat sandstone and siltstone fragments; few mica flakes; slightly acid; gradual wavy boundary.

B22—37 to 48 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; very friable; few wormholes; few thin sandstone fragments; neutral; gradual wavy boundary.

C—48 to 60 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; friable; thin light yellowish brown bedding planes; neutral.

Solum thickness ranges from 30 to 50 inches, and depth to bedrock is 60 inches or more. Coarse fragments, mostly pebbles, range from 0 to 15 percent in the A and B horizons and from 0 to 60 percent in the C horizon. Reaction ranges from medium acid to neutral in the A and B horizons and from strongly acid to neutral in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam, silt loam, sandy loam, or fine sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Some pedons have mottles in shades of gray or brown below 24 inches. Texture is loam, silt loam, fine sandy loam, or sandy loam.

The C horizon is commonly stratified. It is gravelly and very gravelly analogues of loam, fine sandy loam, sandy loam, or loamy fine sand. It is massive or single grained. The consistence is friable, very friable, or loose.

Latham series

The Latham series consists of moderately well drained soils. Permeability is slow or very slow. These soils formed in residuum of acid clayey shales. They occur on rounded ridges, points, and benches. Slopes range from 15 to 30 percent but are dominantly about 20 percent. The soils of the Latham series are clayey, mixed, mesic Aquic Hapludults.

Latham soils are on the same landscape position as the Cutshin, Dekalb, Gilpin, and Shelocta soils. Cutshin, Gilpin, and Shelocta soils have a deep, fine-loamy control section, and they are on mountainsides. Dekalb soils have a loamy-skeletal control section.

Typical pedon of Latham silt loam that has 25 percent slopes, in an area of Dekalb-Rock outcrop-Latham association, steep, in Leslie County, on a wooded ridge between Dicks Branch and Polls Creek at Daley.

O1—1 inch to 0; dark brown humus and partly decomposed organic matter.

A1—0 to 3 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; friable; common fine and coarse roots; medium acid; clear wavy boundary.

B21t—3 to 19 inches; yellowish brown (10YR 5/6) silty clay loam; moderate subangular and angular blocky structure; firm; common fine roots; thin patchy clay films on faces of peds; few thin flat shale fragments; strongly acid; clear wavy boundary.

B22t—19 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; moderate coarse angular and subangular blocky structure; firm; few fine roots; common clay films; 15 percent thin flat weathered shale fragments; very strongly acid; gradual wavy boundary.

B23t—26 to 33 inches; yellowish brown (10YR 5/6) silty clay; few medium distinct light brownish gray (10YR 6/2) and light olive brown (2.5Y 5/4) mottles; weak medium and coarse subangular blocky structure; thin patchy clay films on vertical and horizontal faces of peds and on coarse fragments; 25 percent partly weathered shale fragments; very strongly acid; diffuse wavy boundary.

Cr—33 inches; light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) soft shale; massive with relict shale structure.

Solum thickness and depth to soft bedrock ranges from 20 to 40 inches. Reaction ranges from neutral to very strongly acid in the A horizon and from extremely acid to strongly acid in the B horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam or silty clay loam. Some pedons have colluvial material up to 18 inches thick that is channery or gravelly analogues of loam or fine sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay. The B23t horizon has mottles in shades of gray or brown; mottles that have chroma of 2 or less are within the upper 24 inches of the argillic horizon.

The Cr horizon is weathered clayey shale, massive or platy, and silty clay or silty clay loam. Colors are shades of gray or brown.

Rowdy series

The Rowdy series consists of deep, well drained soils. Permeability is moderate. These nearly level to gently sloping soils formed in loamy alluvium on low stream terraces that are rarely flooded. Slopes range from 2 to 6 percent. Soils of the Rowdy series are fine-loamy, mixed, mesic Fluventic Dystrochrepts.

Rowdy soils are associated with Combs, Cutshin, Grigsby, and Shelocta soils. Combs and Grigsby soils are on flood plains and have coarse-loamy control sections. In addition, Combs soils have a thick dark A horizon. Cutshin and Shelocta soils are on mountainsides.

Typical pedon of Rowdy loam that has smooth 2 percent slopes, in an area of Grigsby-Rowdy complex, 0 to 6 percent slopes, in Perry County, 0.6 mile north of Rowdy Post Office on Kentucky Highway 476, about midway between a power pole and Troublesome Creek.

Ap—0 to 7 inches; brown (10YR 4/3) loam; weak medium platy and granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

B1—7 to 19 inches; dark yellowish brown (10YR 4/4) loam; weak medium and fine subangular blocky structure; friable; common fine roots; brown (10YR 4/3) coatings on faces of peds; medium acid; clear smooth boundary.

B21—19 to 30 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; common fine roots; thin patchy brown (7.5YR 5/4) clay films; dark yellowish brown (10YR 4/4) coatings; 2 percent sandstone fragments at about 28 inches; medium acid; clear smooth boundary.

B22—30 to 50 inches; yellowish brown (10YR 5/6) loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; thin patchy clay films; yellowish brown (10YR 5/4) coatings; strongly acid; clear smooth boundary.

C1—50 to 65 inches; yellowish brown (10YR 5/6) loam; few fine faint light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; strongly acid; clear smooth boundary.

C2—65 to 80 inches; pale brown (10YR 6/3) clay loam; common fine distinct strong brown (7.5YR 5/8) and light gray (10YR 7/2) mottles; massive; firm; many dark concretions; strongly acid.

Solum thickness ranges from 40 to 60 inches or more. Depth to bedrock is more than 60 inches. Content of coarse fragments ranging from 2 millimeters to about 4 inches comprises 0 to 30 percent, by volume, of the A and B horizons and from 0 to 60 percent of the C horizon. The soil ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is loam, silt loam, or fine sandy loam.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is a gravelly analogue of loam, silt loam, or fine sandy loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is gravelly analogues of loam, silt loam, or sandy clay loam. The lower part of the B2 horizon may have mottles in shades of brown or gray.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is gravelly or very gravelly analogues of loam, fine sandy loam, sandy loam, clay loam, or sandy clay loam. Some pedons are stratified.

Shelocta series

The Shelocta series consists of deep, well drained soils. Permeability is moderate. These soils formed in colluvial material derived chiefly from siltstone, sandstone, and shale. Slopes range from 15 to 60 percent. The soils of the Shelocta series are fine-loamy, mixed, mesic Typic Hapludults.

Shelocta soils are associated with the Cutshin, Dekalb, Gilpin, and Latham soils. Cutshin soils have a thick dark surface layer. In Dekalb, Gilpin, and Latham soils, depth to bedrock is less than 40 inches. In addition, Dekalb soils formed in loamy-skeletal material, and Latham soils formed in fine textured materials derived from shale.

Typical pedon of Shelocta silt loam, on a steep mountainside in an area of Shelocta-Gilpin association, steep, in Perry County, near the head of First Creek at Harveyton.

O1—1 inch to 0; recent forest litter.

A1—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; 5 percent coarse sandstone fragments; medium acid; clear smooth boundary.

B21t—5 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; many fine roots; few thin clay films; 5 percent coarse sandstone fragments; medium acid; clear smooth boundary.

B22—17 to 38 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate fine and medium angular blocky structure; friable; common fine roots; many yellowish brown (10YR 5/4) clay films; 25 percent coarse sandstone fragments 1 inch to 6 inches across; strongly acid; clear smooth boundary.

B23t—38 to 60 inches; strong brown (7.5YR 5/6) shaly silty clay loam; moderate fine and medium angular blocky structure; friable; common fine roots; many yellowish brown (10YR 5/4) clay films; 25 percent dominantly shale fragments; strongly acid.

C—60 to 72 inches; strong brown (7.5YR 5/6) channery loam; massive; firm; 30 percent coarse fragments of shale and siltstone; very strongly acid.

Solum thickness ranges from 40 to 60 inches. Depth to hard rock is more than 48 inches. Coarse fragments range from 5 to 35 percent, by volume, and are scattered throughout the soil in an irregular pattern; individual horizons may be gravelly, channery, shaly, or flaggy.

The A, B21t, and B22t horizons range from medium acid to very strongly acid, and the B23t and C horizons range from strongly acid to very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is gravelly, channery, or shaly analogues of silt loam or loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 6, and chroma of 4 to 8. Texture is channery, gravelly, or shaly analogues of silty clay loam or silt loam.

The C horizon is similar to the B2t horizon in color and texture. The horizon is massive or has weak blocky structure. Some pedons have mottles in shades of brown, gray, red, or olive.

formation of the soils

In this section the factors of soil formation are discussed and related to the soils in the survey area. In addition the processes of soil formation are described.

factors of soil formation

This section discusses the major factors and processes that have affected the formation and morphology of soils for the survey area. The characteristics of a soil depend on climate, on plant and animal life, on the chemical and physical properties of the parent material, on relief, and on time. The relative influence of each factor varies from place to place, and in some places one factor may dominate in the formation of a soil. These factors are all interrelated and interdependent.

In the eastern coalfields of Kentucky, the influence of man on soils has been great. For example, with bulldozers and other earth moving equipment, man has created and highly modified large areas of soils.

climate

Climate has a pronounced effect on soils and vegetation within a relatively small geographic area. Soil development and the physiological activity of plants within the different microclimates have been documented by field and laboratory data gathered in making this soil survey (*7*).

The soils on uplands can be characterized as mesic, or medium in soil temperature, and xeric, or dry in moisture regime.

Shallow to moderately deep, loamy, clayey, or sandy soils on ridgetops and upper slopes are characterized by dryness and a high content of rock fragments. Dekalb soils on ridgetops are loamy-skeletal, and Latham soils on mountainsides are clayey. The O and A horizons of these soils are thin, and the B horizon is weakly developed. South- and west-facing slopes receive more direct radiation from the sun and are hotter and drier than the north and east slopes. For example, the Shelocta-Gilpin soils on ridges have thin O and A horizons but a well developed B horizon. The coolest sites are lower slopes that face east to north and the concave draws in the coves. The Shelocta soils on the north- to east-facing slopes have a dark A horizon about 5 inches thick overlying the well developed B horizon. Cutshin soils in the coves and on concave slopes have an A horizon that is dark colored, is about 10 inches thick, and overlies a weakly expressed B horizon.

Surface mining has created a large acreage of young soils, such as the Fairpoint soils. Most of these soils formed from unweathered and unleached parent material. Weathering of the surface reduces small fragments to fine soil material, usually within a few years. Shale and siltstone are especially susceptible to breakdown by weathering.

plant and animal life

All living organisms including vegetation, bacteria and fungi, and animals are active forces that affect the formation of soils. Vegetation usually supplies the organic matter that decomposes to give soils a dark colored surface layer and transfers or cycles nutrients from the subsoil to the surface layer. Bacteria and fungi decompose the organic matter and release the minerals into the soil. Mixing of the soil by the action of worms, insects, and burrowing animals affects the soil tilth and porosity.

Man affects the physical properties of soils by tillage and management practices. He can alter soils chemically by the use of lime, fertilizers, insecticides, and herbicides. The movement of vehicles on the soil surface compacts soils and makes them more dense.

Through strip mining, man has helped in the formation of new soils. These soils form where sediment from strip mining is deposited on mountainsides and in flood plains. They are subject to severe erosion, and their chemical, physical, and mineralogical properties are commonly quite variable within a few yards at the surface and within a few inches throughout the profile. Fairpoint soils that formed as a result of surface mining are extensive in the survey area.

parent material

Parent material is the unconsolidated geologic material from which soils have formed. It influences the physical and chemical properties of the soil as well as the rate at which soil formation takes place.

In this survey area soils are formed in four types of parent material: (1) residual material derived from the weathering of rocks of the Pennsylvanian geologic system; (2) colluvial materials deposited on mountainsides over long periods of time; (3) recent alluvial deposits on flood plains and on stream terraces; and (4) soil and geologic material disturbed by strip mining and construction.

Residual parent material weathered from rocks is mostly on ridgetops and very steep hillsides. This residuum is derived chiefly from sandstone, siltstone, and shale with intermittent coal seams. In places thin beds and concretions of limestone are in the sedimentary rocks. This is the parent material for the Dekalb and Latham soils.

Colluvial material deposited by water and gravity covers roughly the lower two-thirds of the mountains. The material may be sandy or loamy and usually contains less than 35 percent rock fragments. Thickness of this material ranges from about 40 inches on the upper part to more than 60 inches on the lower part of the hillside and in coves. In places, especially on toe slopes, colluvial material may be 30 feet or more thick. This is the parent material for Shelocta and Cutshin soils.

Recent alluvial deposits consist of material that has been washed from uplands and deposited by streams. Most of the Grigsby and Combs soils formed in these recent alluvial materials. Rowdy soils also formed in alluvium. They are on young stream terraces and are rarely flooded.

Fairpoint soils formed from soil material and fragments of bedrock that were mixed together by mining operations. The mixing of this material in varying proportions may exhibit marked heterogeneity of soils over short distances in regard to parent materials, strata, texture, reaction, color and content, and size of washed fragments. Fairpoint soils are classified as Typic Udorthents. They are on benches or cuts and outslopes and in filled hollows and areas where mountaintops have been removed.

time

The length of time that parent material has been in place and exposed to the active forces of climate as well as plant and animal life strongly influences the nature of the soil.

The soils of Leslie and Perry Counties are relatively young. As weathering processes act upon the exposed rocks, mostly on points and ridges, the residue is subjected to the forces of water and gravity. Weathered soil material and rock fragments are carried downslope and deposited as colluvium.

Where the colluvial deposits become thicker, the heavy weight of the colluvium, steep angle of slope, and water seeping along the bedrock tend to move the mass very slowly and irregularly downslope onto the flood plain. Soil is removed from the valleys by the action of the streams. Thus the valleys slowly become wider while the mountains become smaller.

Relatively young soils on ridgetops have developed soil structure and a B horizon well defined by color, but have little illuvial clay accumulation. Dekalb soils are classified as Typic Dystrochrepts.

Most soils on mountainsides have a thick, well defined B horizon with a significant accumulation of illuvial clay. Examples are Shelocta and Gilpin soils, which are classified as Typic Hapludults. Soils in coves and on concave slopes with cool aspects are characterized by a thick, dark surface layer. For example, Cutshin soils, which are classified as Typic Haplumbrepts.

Fairpoint soils, man-deposited residue from coal mining, are essentially unaltered, heterogeneous, geologic material. The C horizon in these soils extends essentially to the surface and is subdivided on the basis of texture, percentage of rock fragments, and reaction. Fairpoint soils may have O or A horizons and some have an indistinct B horizon. The action of earthworms and plants is quite evident in Fairpoint soils that have been in place for several years. Fairpoint soils are classified as Typic Udorthents.

Soils of the valleys are divided into those on flood plains and those on stream terraces. The Grigsby soils on flood plains formed in recent alluvial deposits along streams. These soils for the most part are not stratified and have developed soil structure in the subsoil. However, some recent alluvial deposits that show stratification and do not have structure in the subsoil are mapped with the Grigsby soils. These soils on flood plains are classified Dystric Fluventic Eutrochrepts with inclusions of Entisols.

Young soils on terraces, such as the Rowdy soils, formed in water deposited material but do not now receive a significant amount of deposition. They are leached and weathered, and the amount of illuvial clay they contain depends upon their position in relation to the stream. Rowdy soils are classified as Fluventic Dystrochrepts.

relief

The survey area is located in the eastern coalfield physiographic region. It is within a large dissected plateau of narrow winding ridges, steep valley walls, and narrow elongated bottoms. The level-bedded rocks are part of the Breathitt Formation of the Pottsville Series of the Lower and Middle Pennsylvanian System. Sandstone, siltstone, and shale of various hardness with interbedded coalbeds have weathered to form a benched landscape with a dendritic drainage pattern.

In soil formation, relief controls surface drainage and affects water percolation. Also, relief may affect the soil depth and water-holding capacity, which in turn affects plant and animal life and some soil-forming processes. Soils on ridgetops and points, such as Dekalb soils, are usually less than 40 inches to bedrock, have more than 35 percent rock fragments, and have a weakly expressed B horizon. They may also have a noticeable amount of stones on the surface associated with Rock outcrops. Soils on mountainsides formed chiefly in colluvial material. They are variable in depth to bedrock because they have complex slopes that are benched and dissected. The Shelocta soils on mountainsides are deeper than 48 inches to rock and have a well defined B horizon.

Natural differences in elevation and shape of landforms account for many differences in the kinds of soils that formed in the survey area. The residual soils formed on higher elevations, ridges, and points. Most soils on mountainsides formed in colluvial material. Soils on flood plains formed in alluvial deposits except for the soils influenced by limestone in the Pine Mountain area and the soils on flood plains that formed in material weathered from sandstone, siltstone, and shale.

Through strip mining, man has complicated relief as a soil-forming factor. By reshaping the land and making new landforms, man has changed drainage relationships and affected the rate of chemical and physical processes of soil formation.

processes of soil formation

The results of the soil-forming factors are evidenced by the different layers, or soil horizons, in a profile. The soil profile extends from the surface down to materials that are little altered by soil-forming processes.

Most soils contain three major horizons—the A, B, and C horizons. Soils under a forest canopy have an O (organic) horizon at the surface. This horizon is an accumulation of organic materials, such as twigs and leaves or of humified organic material, that has little mixture of mineral material. Numbers and letters can be used to indicate differences that mark the subdivisions within the major horizons. The B2t horizon, for example, represents the most strongly developed part of a B horizon that has an accumulation of clay from overlying horizons. The Shelocta soils have a B2t horizon.

The A horizon is a mineral surface layer. The A1 horizon is darkened by humified organic matter. An Ap horizon commonly is a plow layer also darkened with organic matter. The A horizon is a layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the soil material, the horizon is called the A2. Where it occurs, the A2 horizon is normally the lightest colored horizon in the profile.

The B horizon normally underlies the A horizon and is called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer.

In some soils, such as the Dekalb soils, the B horizon is formed mainly by the alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the releasing of iron to give the rusty color, and the development of soil structure instead of the original rock or sediment structure. The B horizon commonly has blocky or prismatic structure. This horizon generally is firmer and is lighter in color than the A1 horizon, but it is darker colored than the C horizon or the A2 horizon. The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil-forming processes, but it may be modified by weathering.

In young soils, such as those formed in recent alluvium or in man-deposited fill materials, the C horizon may reach to or nearly to the soil surface. In these soils, the B horizon and in places even the A horizon may be absent.

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often operate simultaneously. They have been going on for thousands of years in old soils.

The accumulation and incorporation of organic matter take place as plant residue and applied organic materials decompose and are mixed into the soil. These additions darken the mineral soil materials and are responsible for forming the A1 horizon.

For soils to have a distinct subsoil, they must be leached of lime and more soluble materials. Once this has taken place, the clay can be translocated more easily and be moved as part of the percolant. Clay has accumulated in the Bt horizon of the soils classified as Ultisols by being leached from the A horizon and deposited in the B horizon as a result of flocculation and the drying up of the percolating water. Also, clay from dissolved silica and aluminum has accumulated in these horizons. The more inert materials, such as silt and sand-sized quartz, are concentrated in the A horizon as the more soluble material and clay are leached into the next horizon.

The naturally well drained soils in the survey area generally have a yellowish brown or strong brown subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, or clay particles. These iron oxides formed from iron released during the weathering of silica minerals in the present soil or in the parent material in which the soil developed.

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glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.
Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.
Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.
Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.
Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.
Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
Bottom land. The normal flood plain of a stream, subject to flooding.
Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.
Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.
Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.
Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
Coarse textured soil. Sand or loamy sand.
Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.
Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.
Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.
Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.
Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—
Loose.—Noncoherent when dry or moist; does not hold together in a mass.
Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form

a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or risk of deterioration of concrete.

Dendritic drainage. This is characterized by irregular branching of tributary streams in many directions and at almost any angle, although usually at considerably less than a right angle.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Mesophytic. Adapted to medium conditions of moisture.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outslope. Soil material pushed downslope from a bed during strip mining.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded 1962-77 at Hyden, Ky.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	43.1	20.7	31.8	72	-11	77	4.03	2.19	5.52	8	7.7
February---	47.1	22.6	34.9	74	-4	56	3.33	1.76	4.60	7	4.1
March------	58.5	31.2	44.9	83	12	221	5.53	3.07	7.54	9	1.1
April------	70.1	40.0	55.1	88	23	453	4.23	2.33	5.77	7	.0
May--------	77.2	49.7	63.5	90	31	729	4.48	2.47	6.11	8	.0
June-------	82.9	58.0	70.5	93	44	915	4.46	2.93	5.85	8	.0
July-------	85.8	62.5	74.2	95	51	1,060	4.62	2.38	6.44	9	.0
August-----	84.8	62.0	73.4	94	50	1,035	3.77	1.62	5.50	7	.0
September--	78.9	55.4	67.2	93	37	816	3.56	1.67	5.10	6	.0
October----	69.2	41.8	55.5	84	23	487	3.40	1.36	5.05	6	.0
November---	57.1	32.5	44.8	79	13	175	3.62	2.01	4.92	7	.8
December---	47.2	25.0	36.1	72	-1	92	3.82	1.78	5.48	6	3.6
Yearly:											
Average--	66.8	41.8	54.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	96	-11	---	---	---	---	---	---
Total----	---	---	---	---	---	6,116	48.85	43.23	54.29	88	17.3

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded 1962-77 at Hyden, Ky.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 5	April 25	May 12
2 years in 10 later than--	March 31	April 20	May 8
5 years in 10 later than--	March 22	April 12	April 28
First freezing temperature in fall:			
1 year in 10 earlier than--	October 26	October 14	October 9
2 years in 10 earlier than--	October 31	October 20	October 13
5 years in 10 earlier than--	November 7	October 30	October 20

TABLE 3.--GROWING SEASON

[Recorded 1962-77 at Hyden, Ky.]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	214	181	156
8 years in 10	220	188	162
5 years in 10	231	202	174
2 years in 10	242	216	187
1 year in 10	251	227	196

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Leslie county	Perry county	Total-- Area	Extent
		Acres	Acres	Acres	Pct
Co	Combs loam	920	1,430	2,350	0.5
DLF	Dekalb-Rock outcrop-Latham association, steep	87,280	63,830	151,110	31.4
FaB	Fairpoint soils, undulating	360	440	800	0.2
FaF	Fairpoint soils, steep, benched	11,500	27,370	38,870	8.1
Gr	Grigsby-Rowdy complex, 0 to 6 percent slopes	2,130	2,940	5,070	1.1
SCF	Shelocta-Cutshin association, steep	88,410	66,130	154,540	32.2
SGF	Shelocta-Gilpin association, steep	71,160	56,100	127,260	26.5
	Total	261,760	218,240	480,000	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Corn	Wheat	Tobacco	Grass-legume hay	Pasture
	Bu	Bu	Lb	Ton	AUM*
Co Combs	135	45	3,200	4.5	8.5
DLF:**					
Dekalb	---	---	---	---	---
Rock outcrop.					
Latham	---	---	---	---	---
FaB Fairpoint	---	---	---	---	3.0
FaF Fairpoint	---	---	---	---	---
Gr Grigsby-Rowdy	125	40	3,000	4.0	7.0
SCF:**					
Shelocta	---	---	---	---	---
Cutshin	---	---	---	---	---
SGF:**					
Shelocta	---	---	---	---	---
Gilpin	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I:					
Leslie County	3,050	---	---	---	---
Perry County	4,370	---	---	---	---
II:					
Leslie County	---	---	---	---	---
Perry County	---	---	---	---	---
III:					
Leslie County	---	---	---	---	---
Perry County	---	---	---	---	---
IV:					
Leslie County	---	---	---	---	---
Perry County	---	---	---	---	---
V:					
Leslie County	---	---	---	---	---
Perry County	---	---	---	---	---
VI:					
Leslie County	360	---	---	360	---
Perry County	440	---	---	440	---
VII:					
Leslie County	258,350	171,070	---	87,280	---
Perry County	213,430	149,600	---	63,830	---
VIII:					
Leslie County	---	---	---	---	---
Perry County	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
Co: Combs	1o	Slight	Slight	Slight	Severe	Yellow-poplar Northern red oak	115 90	Yellow-poplar, black walnut, black cherry, eastern white pine.
DLF:* Dekalb	3r	Moderate	Severe	Moderate	Moderate	Scarlet oak Shortleaf pine Pitch pine	70 66 72	Eastern white pine, Virginia pine, shortleaf pine.
Rock outcrop.								
Latham (north aspect)	3c	Severe	Severe	Slight	Moderate	Black oak Shortleaf pine Virginia pine	71 76 76	Eastern white pine, shortleaf pine, Virginia pine.
Latham (south aspect)	4c	Severe	Severe	Moderate	Slight	Shortleaf pine Virginia pine White oak	56 57 64	Eastern white pine, Virginia pine, shortleaf pine.
FaB*: Fairpoint	---	--------	--------	--------	--------	-------------------	---	Eastern white pine, black locust, yellow-poplar, shortleaf pine, Virginia pine.
FaF*: Fairpoint	---	--------	--------	--------	--------	-------------------	---	Eastern white pine, black locust, yellow-poplar, shortleaf pine, Virginia pine.
Gr:* Grigsby	1o	Slight	Slight	Slight	Severe	Yellow-poplar Northern red oak	110 85	Yellow-poplar, black walnut, black cherry, eastern white pine.
Rowdy	1o	Slight	Slight	Slight	Severe	Yellow-poplar Bur oak American sycamore Black walnut River birch	100 --- --- --- ---	Yellow-poplar, black walnut, eastern white pine.
SCF:* Shelocta	2r	Moderate	Severe	Slight	Severe	Northern red oak Yellow-poplar Virginia pine Shortleaf pine	76 102 78 75	Eastern white pine, yellow-poplar, black walnut, Virginia pine.
Cutshin	1r	Moderate	Severe	Slight	Severe	Yellow-poplar Northern red oak	112 98	Eastern white pine, yellow-poplar, black walnut, white ash.
SGF:* Shelocta	3r	Moderate	Severe	Slight	Moderate	Northern red oak Virginia pine Shortleaf pine	69 71 65	Eastern white pine, Virginia pine, shortleaf pine.
Gilpin	3r	Severe	Severe	Slight	Moderate	Virginia pine Scarlet oak	67 70	Eastern white pine, Virginia pine, shortleaf pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Co: Combs	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
DLF:*					
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
Rock outcrop.					
Latham	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: erodes easily.	Severe: slope.
FaB*: Fairpoint	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: erodes easily.	Severe: small stones, droughty.
FaF*: Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: small stones, droughty, slope.
Gr:*					
Grigsby	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
Rowdy	Severe: floods.	Slight	Moderate: slope.	Slight	Slight.
SCF:*					
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cutshin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
SGF:*					
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.		Severe: slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor"]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Co------------------ Combs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
DLF:*										
Dekalb------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
Latham------------	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FaB*--------------- Fairpoint	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
FaF*--------------- Fairpoint	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Gr:*										
Grigsby.	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rowdy-------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SCF:*										
Shelocta----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cutshin-----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
SGF:*										
Shelocta----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gilpin------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Co: Combs	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
DLF:*						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Rock outcrop.						
Latham	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FaB*: Fairpoint	Moderate: large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Severe: small stones, droughty.
FaF*: Fairpoint	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: small stones, droughty, slope.
Gr:*						
Grigsby	Moderate: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Rowdy	Slight	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.	Slight.
SCF:*						
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cutshin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SGF:*						
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Co------------------ Combs	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
DLF:*					
Dekalb-------------	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
Rock outcrop.					
Latham-------------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
FaB*---------------- Fairpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
FaF*---------------- Fairpoint	Severe: percs slowly, slope, slippage.	Severe: slope.	Severe: slope, slippage.	Severe: slope.	Poor: small stones, slope.
Gr:*					
Grigsby------------	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Rowdy--------------	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Moderate: floods.	Fair: small stones.
SCF:*					
Shelocta-----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
Cutshin------------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
SGF:*					
Shelocta-----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
Gilpin-------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable"]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Co: Combs	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
DLF:*				
Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rock outcrop.				
Latham	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FaB*: Fairpoint	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
FaF*: Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Gr:*				
Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Rowdy	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
SCF:*				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Cutshin	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
SGF:*				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes and levees	Drainage	Terraces and diversions	Grassed waterways
Co----------------- Combs	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
DLF:*					
Dekalb-----------	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water----	Slope, large stones, depth to rock.	Slope, large stones, droughty.
Rock outcrop.					
Latham-----------	Severe: slope.	Severe: thin layer.	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
FaB*-------------- Fairpoint	Slight------------	Severe: piping.	Deep to water----	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
FaF*-------------- Fairpoint	Severe: slope, slippage.	Severe: piping.	Deep to water----	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Gr:*					
Grigsby----------	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
Rowdy------------	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
SCF:*					
Shelocta---------	Severe: slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Cutshin----------	Severe: slope.	Severe: piping.	Deep to water----	Slope, large stones.	Large stones, slope, droughty.
SGF:*					
Shelocta---------	Severe: slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
Gilpin-----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Co----------------- Combs	0-23	Loam-------------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	80-100	30-80	<25	NP-5
	23-80	Loam, fine sandy loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	80-100	30-80	<25	NP-5
DLF:* Dekalb----------	0-2	Channery loam----	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	15-32	NP-9
	2-34	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Latham----------	0-3	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	85-100	70-100	70-100	65-90	20-35	5-12
	3-33	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
FaB*------------- Fairpoint	0-6	Channery silt loam.	CL, CL-ML, SC, GC	A-4, A-6, A-2	5-30	55-90	45-85	40-85	30-75	20-40	4-18
	6-60	Gravelly clay loam, very shaly silty clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-75	20-70	15-65	25-50	4-24
FaF*------------- Fairpoint	0-6	Channery silt loam.	CL, CL-ML, SC, GC	A-4, A-6, A-2	5-30	55-90	45-85	40-85	30-75	20-40	4-18
	6-60	Gravelly clay loam, very shaly silty clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-75	20-70	15-65	25-50	4-24
Gr:* Grigsby---------	0-7	Loam-------------	ML, CL-ML, CL	A-4	0-5	80-100	80-100	70-100	50-80	<25	NP-10
	7-48	Loam, fine sandy loam, silt loam.	ML, SM, SM-SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	48-60	Fine sandy loam, loam, gravelly sandy loam.	SM, SM-SC, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5
Rowdy-----------	0-7	Loam-------------	ML, SC, CL, SM	A-4	0	80-100	80-100	70-100	40-75	<30	NP-10
	7-50	Loam, gravelly loam, sandy clay loam.	ML, CL, GM, SC	A-4, A-6, A-2	0-5	60-100	60-100	50-100	25-75	<30	NP-15
	50-80	Loam, clay loam, gravelly sandy loam.	ML, GM-GC, SM-SC, CL	A-4, A-2, A-6	0-25	30-100	30-100	25-100	20-75	<30	NP-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SCF:*											
Shelocta--------	0-5	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	5-60	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	60-72	Channery silt loam, channery silty clay loam, very channery clay loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-b	0-15	40-85	35-70	25-70	20-65	20-40	3-20
Cutshin---------	0-19	Channery loam----	CL, ML, GC, SC	A-4, A-6, A-2, A-5	0-20	55-85	50-80	40-75	30-60	20-45	3-15
	19-50	Channery loam, gravelly loam, flaggy clay loam.	CL, CL-ML, ML, GC	A-4, A-6, A-2, A-5	0-20	55-85	50-80	40-75	30-60	20-45	3-15
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
SGF:*											
Shelocta--------	0-5	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	5-60	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	60-72	Channery silt loam, channery silty clay loam, very channery clay loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-b	0-15	40-85	35-70	25-70	20-65	20-40	3-20
Gilpin----------	0-4	Channery silt loam.	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-36	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES

[Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
Co---------------- Combs	0-23	5-18	1.20-1.50	0.6-6.0	0.12-0.21	5.6-7.3	Low-----------	0.28	5	2-5
	23-80	5-18	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low-----------	0.28		
DLF:*										
Dekalb-----------	0-2	10-20	1.20-1.50	2.0-20	0.08-0.12	3.6-6.5	Low-----------	0.17	3	2-4
	2-34	7-18	1.20-1.50	2.0-20	0.06-0.12	3.6-5.5	Low-----------	0.17		
	34	---	---	---	---	---	-------------	----		
Rock outcrop.										
Latham-----------	0-3	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-5.5	Low-----------	0.43	3	1-3
	3-33	35-55	1.40-1.70	<0.2	0.11-0.15	3.6-5.5	Moderate-----	0.32		
	33	---	---	---	---	---	-------------	----		
FaB*------------- Fairpoint	0-6	18-35	1.40-1.55	0.6-2.0	0.09-0.18	5.6-7.3	Low-----------	0.37	5	<.5
	6-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.37		
FaF*------------- Fairpoint	0-6	18-35	1.40-1.55	0.6-2.0	0.09-0.18	5.6-7.3	Low-----------	0.37	5	<.5
	6-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.37		
Gr:*										
Grigsby----------	0-7	5-25	1.20-1.40	0.6-6.0	0.10-0.20	5.6-7.3	Low-----------	0.28	5	1-4
	7-48	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low-----------	0.28		
	48-60	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low-----------	0.28		
Rowdy------------	0-7	10-25	1.20-1.40	0.6-2.0	0.11-0.21	4.5-7.3	Low-----------	0.32	5	1-3
	7-50	18-30	1.20-1.50	0.6-2.0	0.09-0.21	4.5-6.0	Low-----------	0.28		
	50-80	10-30	1.20-1.50	0.6-6.0	0.07-0.18	4.5-6.0	Low-----------	0.28		
SCF:*										
Shelocta---------	0-5	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-6.0	Low-----------	0.32	4	.5-5
	5-60	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	60-72	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
Cutshin----------	0-19	18-30	1.20-1.40	0.6-2.0	0.10-0.20	5.6-7.3	Low-----------	0.28	4	3-7
	19-50	18-30	1.20-1.40	0.6-2.0	0.08-0.16	4.5-6.0	Low-----------	0.28		
	50-60	---	---	---	---	---	-------------	----		
SGF:*										
Shelocta---------	0-5	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-6.0	Low-----------	0.32	4	.5-5
	5-60	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	60-72	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
Gilpin-----------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	1-4
	4-36	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low-----------	0.24		
	36	---	---	---	---	---	-------------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
Co----------------- Combs	B	Frequent----	Brief-----	Dec-May	>6.0	---	---	>60	---	Low------	Low.
DLF:*											
Dekalb-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
Rock outcrop.											
Latham-----------	D	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High.
FaB*-------------- Fairpoint	C	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
FaF*-------------- Fairpoint	C	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Gr:*											
Grigsby----------	B	Frequent----	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
Rowdy------------	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
SCF:*											
Shelocta---------	B	None--------	---	---	>6.0	---	---	>48	Hard	Low------	High.
Cutshin----------	B	None--------	---	---	>6.0	---	---	>40	Soft	Low------	Low.
SGF:*											
Shelocta---------	B	None--------	---	---	>6.0	---	---	>48	Hard	Low------	High.
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS

[A dash indicates material was not detected]

Soil name, report number, horizon, and depth in inches	Size class and particle diameter (millimeters): Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Percent less than 2 millimeters											Pct	Pct	Pct
Combs loam: (77KY-193-6)														
Ap-----------0-8	44	50	6	1	1	1	22	19	25	69	Loam, silt loam	2	1	1
A12----------8-23	46	40	14	0	1	2	26	17	29	57	Loam	4	---	4
B21---------23-44	54	32	14	0	0	2	32	20	34	52	Fine sandy loam	---	---	---
B22---------44-64	42	42	16	0	0	1	20	21	21	63	Loam	---	---	---
B23---------64-80	50	35	15	0	0	1	28	21	29	56	Loam	---	---	---
Cutshin channery loam:[1] (77KY-193-4)														
A1-----------0-13	41	38	21	4	8	10	14	5	36	43	Loam	21	5	16
A2----------13-18	42	41	17	5	8	9	13	7	35	48	Loam	35	13	22
B21---------18-26	44	39	17	6	8	9	13	8	36	47	Loam	27	11	16
B22---------26-40	44	40	16	7	8	8	13	8	36	48	Loam	19	12	7
B3----------40-52	43	43	14	11	8	5	10	8	33	51	Loam	15	11	4
Fairpoint channery silt loam:[2] (77KY-193-1)														
A------------0-6	15	66	19	4	2	1	3	5	10	71	Silt loam	12	6	6
C1-----------6-18	19	59	22	4	3	2	4	6	13	65	Silt loam	33	12	21
C1----------18-30	20	58	22	5	3	1	4	7	13	65	Silt loam	24	12	12
C2----------30-42	21	57	22	5	3	2	4	7	14	64	Silt loam	12	8	4
C2----------42-60	23	56	21	6	4	2	4	7	16	63	Silt loam	27	8	19
Grigsby loam: (77KY-193-5)														
Ap------------0-6	31	46	23	0	1	1	13	16	15	62	Loam	---	---	---
B21-----------6-14	51	38	11	0	1	4	26	20	31	58	Loam	---	---	---
B22----------14-30	66	25	9	0	2	12	36	16	50	41	Fine sandy loam	---	---	---
C1-----------30-45	82	13	5	0	5	20	46	11	71	24	Loamy sand	---	---	---
C2-----------45-62	78	16	6	0	2	11	52	13	65	29	Loamy fine sand	---	---	---
C3-----------62-80	83	13	4	3	12	24	36	8	75	21	Loamy sand	10	5	5

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	Size class and particle diameter (millimeters): Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Percent less than 2 millimeters											Pct	Pct	Pct
Rowdy loam: (77KY-193-3)														
Ap------------0-7	46	35	19	0	1	3	25	17	29	52	Loam	1	---	1
B1------------7-19	48	34	18	0	0	3	26	18	29	52	Loam	---	---	---
B21----------19-30	47	34	19	0	0	4	25	18	29	52	Loam	---	---	---
B22----------30-50	38	44	18	0	1	3	15	19	19	63	Loam	---	---	---
C1-----------50-65	48	34	18	1	4	10	22	11	37	45	Loam	---	---	---
C2-----------65-80	41	31	28	1	4	10	18	8	33	39	Clay loam	---	---	---

[1]This is not the typical pedon for the series. It is a taxadjunct to the Cutshin series because the percent clay in the 10- to 40-inch control section is slighty less than allowed for the series.

[2]About 50 percent of the coarse fragments were discarded during the sampling of this soil.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOILS

[A dash indicates the element was not detected]

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation exchange capacity				Base saturation				
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	Total	Ammonium acetate	Sum of cations	Extractable acidity	Hydrogen plus aluminum	Ammonium acetate	Sum of cations	Organic matter	Calcium carbonate equivalent	Phosphorus
			Milliequivalents per 100 grams of soil									Pct	Pct	Pct	Pct	Ppm
Combs loam: (77KY-193-6)																
Ap----------0-8	5.3	4.2	4.6	0.6	0.1	TR	5.3	9.4	14.4	9.1	0.1	57	37	3.9	0.1	31
A12----------8-23	5.9	4.1	5.7	0.8	0.1	TR	6.6	7.4	8.3	1.7	0.1	89	80	1.2	0.2	10
B21----------23-44	6.2	4.7	4.3	0.5	0.1	TR	4.9	5.2	8.4	3.4	0.1	95	58	0.6	0.2	7
B22----------44-64	6.2	4.7	5.1	0.5	0.1	TR	5.7	6.5	9.7	4.0	0.1	88	59	0.6	0.2	6
B23----------64-80	6.0	4.6	4.2	0.5	0.1	TR	4.8	5.2	8.2	3.4	0.1	91	59	0.3	0.2	6
Cutshin channery loam:[1] (77KY-193-4)																
A1----------0-13	5.6	4.3	3.1	0.9	0.3	TR	4.3	11.9	17.7	13.4	0.2	36	24	5.1	0.2	3
A2----------13-18	5.4	3.9	1.0	0.3	0.1	---	1.4	7.7	10.6	9.1	0.1	19	13	1.4	0.2	2
B21----------18-26	5.3	3.8	0.8	0.5	0.1	TR	1.4	6.9	10.9	9.4	TR	21	13	1.0	0.2	1
B22----------26-40	5.4	3.7	0.2	0.9	0.1	TR	1.2	7.8	9.8	8.6	0.1	16	12	0.4	0.2	1
B3----------40-52	5.4	3.3	0.2	0.8	0.1	TR	1.1	8.9	11.1	10.0	TR	13	10	0.5	0.2	1
Cr----------52-60	5.2	3.3	1.1	1.7	0.2	TR	3.0	10.9	13.8	10.9	0.2	27	22	0.5	0.2	3
Fairpoint channery silt loam: (77KY-193-1)																
A----------0-6	5.6	5.0	3.5	2.7	0.3	0.0	6.5	8.1	9.4	2.9	0.1	80	69	3.1	0.2	5
C1----------6-18	5.4	4.8	4.6	4.4	0.2	0.1	9.3	9.8	16.9	7.6	0.2	95	55	3.4	0.2	3
C2----------18-30	5.6	4.9	4.7	3.9	0.2	0.0	8.8	9.1	12.8	4.0	0.2	97	69	3.4	0.2	4
C3----------30-42	5.8	5.2	4.6	4.0	0.3	0.0	8.9	9.1	12.0	3.1	0.1	98	74	3.2	0.3	3
C4----------42-60	6.0	5.6	5.0	3.2	0.2	0.0	8.4	8.6	11.3	2.9	0.1	98	74	3.1	0.4	4
Grigsby loam: (77KY-193-5)																
Ap----------0-6	5.8	5.0	8.0	2.0	0.3	TR	10.3	11.8	18.3	8.0	0.1	87	56	5.7	0.2	6
B21----------6-14	5.8	4.7	4.5	0.7	TR	TR	5.2	6.9	11.0	5.7	0.1	76	47	2.3	0.2	4
B22----------14-30	6.0	4.9	4.3	0.5	TR	TR	4.8	5.7	9.4	4.6	0.1	84	51	2.2	0.2	2
C1----------30-45	6.1	5.0	2.7	0.3	TR	TR	3.0	3.7	5.9	2.9	0.1	84	51	1.3	0.2	5
C2----------45-62	5.5	4.4	2.6	0.5	TR	TR	3.1	5.0	8.2	5.1	0.1	62	38	2.1	0.2	6
C3----------62-80	5.2	4.3	1.6	0.3	TR	TR	2.0	3.2	5.4	3.4	0.1	62	37	1.1	0.2	9
Rowdy loam: (77KY-193-3)																
Ap----------0-7	5.3	3.9	1.3	0.3	0.2	TR	1.8	7.0	10.4	8.6	0.1	26	17	1.9	0.2	4
B1----------7-19	5.7	4.1	1.7	0.3	0.1	TR	2.1	5.8	8.6	6.6	0.1	35	24	1.0	0.2	2
B21----------19-30	5.6	4.1	1.3	0.3	0.1	TR	1.7	4.9	7.5	5.9	0.1	34	23	0.6	0.2	2
B22----------30-50	5.4	3.8	0.4	0.4	0.1	TR	0.9	6.1	8.0	7.1	TR	14	11	0.4	0.2	2
C1----------50-65	5.3	3.8	0.4	0.5	0.1	TR	1.0	7.1	9.0	8.0	TR	14	11	0.4	0.2	2
C2----------65-80	5.2	3.7	1.3	1.1	0.2	TR	2.6	11.6	14.3	11.7	TR	22	18	0.5	0.2	4

[1]This is not the typical pedon for the series. It is a taxadjunct to the Cutshin series because percent clay in the 10- to 40-inch control section is slightly less than allowed for the series.

TABLE 19.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available.]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution											Liquid limit	Plasticity index[1]	Moisture density	
			Larger than 3 inches	Percentage passing sieve--							Percentage smaller than--						
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
			Pct											Pct		Lb/ft3	Pct
Combs loam:[2] (S77KY-193-006)																	
A12------ 8 to 23	A-4 (00)	CL-ML or ML	0	100	98	97	97	97	97	64	38	24	16	22	4	109	14
B21------23 to 44	A-4 (00)	ML	0	100	100	100	100	100	100	67	32	22	17	22	3	113	13
B23------64 to 80	A-4 (01)	CL-ML	0	100	100	99	99	99	99	61	33	21	15	23	5	114	15
Cutshin channery loam:[3] (S77KY-193-004)																	
A11------ 0 to 13	A-5 (04)	ML	15	100	90	85	80	80	73	56	35	21	14	42	8	91	21
B22------26 to 40	A-4 (01)	ML	20	100	92	87	81	80	73	54	37	23	14	29	6	113	17
Fairpoint channery silt loam:[4] (S77KY-193-001)																	
A-------- 0 to 6	A-4 (03)	CL or ML	25	100	85	79	73	73	68	61	44	26	16	29	8	115	15
C1------- 6 to 30	A-4 (04)	CL or ML	25	100	85	79	73	73	68	63	46	29	17	30	9	114	12
Grigsby loam:[5] (S77KY-193-005)																	
B22------14 to 30	A-4 (00)	SM-SC or SC	0	100	100	100	100	100	98	45	22	14	10	23	7	109	14
C2-------45 to 62	A-2-4(00)	SM	0	100	100	100	99	98	98	34	17	11	8	--	NP	105	16
Rowdy loam:[6] (S77KY-193-003)																	
B1------- 7 to 19	A-4 (01)	CL-ML or ML	0	100	100	100	100	100	100	65	36	24	19	25	4	110	17
B22------30 to 50	A-4 (03)	CL-ML	0	100	100	100	100	100	99	75	40	25	18	27	6	108	15
C2-------65 to 80	A-4 (01)	CL-ML	0	100	100	100	99	99	97	61	42	29	22	25	5	110	14

[1] NP=Nonplastic.

[2] Combs loam:
Near mouth of Oldhouse Branch on North Fork of Kentucky River, about 1.3 mi south of Chavies.

[3] Cutshin channery loam:
Head of Rockhouse Branch, 500 ft northwest of Daniel Boone Parkway, near Leslie-Perry county line.

[4] Fairpoint channery silt loam:
300 yds south of Kentucky Highway 28 and Eversole Creek, 2 mi east of Chavies.

[5] Grigsby loam:
Grapevine Creek flood plain, about 1 mi east of Chavies.

[6] Rowdy loam:
About 0.6 mi north of Rowdy Post Office on Kentucky Highway 476, about midway between a power pole and Troublesome Creek.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Combs	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Cutshin	Fine-loamy, mixed, mesic Typic Haplumbrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Latham	Clayey, mixed, mesic Aquic Hapludults
Rowdy	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults

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